

6th National Conference on West Nile Virus
San Jose, CA
February 8, 2005

**National West Nile Virus Surveillance Summary,
United States, 2004**
By The ArboNET Team

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West Nile Virus (WNV) Surveillance, United States, 2004

- ArboNET Overview
- Mosquitoes
- Birds
- Horses
- Humans
- Summary

The ArboNET Team 2004

- Amy Bode
- Jennifer Brown
- Grant Campbell
- Margaret Collins
- Nicholas Crall
- Lora Davis
- Edward Hayes
- Alison Hinckley
- John Jones
- Krista Kniss
- Stephanie Kuhn
- Jennifer Lehman
- Anthony Marfin
- Susan Montgomery
- Daniel O'Leary
- Theresa Smith

ArboNET

- Arbovirus national electronic surveillance system
- Ecologic data
 - Mosquitoes
 - Birds
 - Horses and other mammals
- Human data
 - Disease cases: fever or neuroinvasive
 - Presumptively viremic donors (PVDs)

Historical Perspective

Progression of West Nile Virus Activity in
the United States, 1999-2004



West Nile Virus Activity

-  Non-Human WNV Activity
-  Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 1999 calendar year

CDC



West Nile Virus Activity

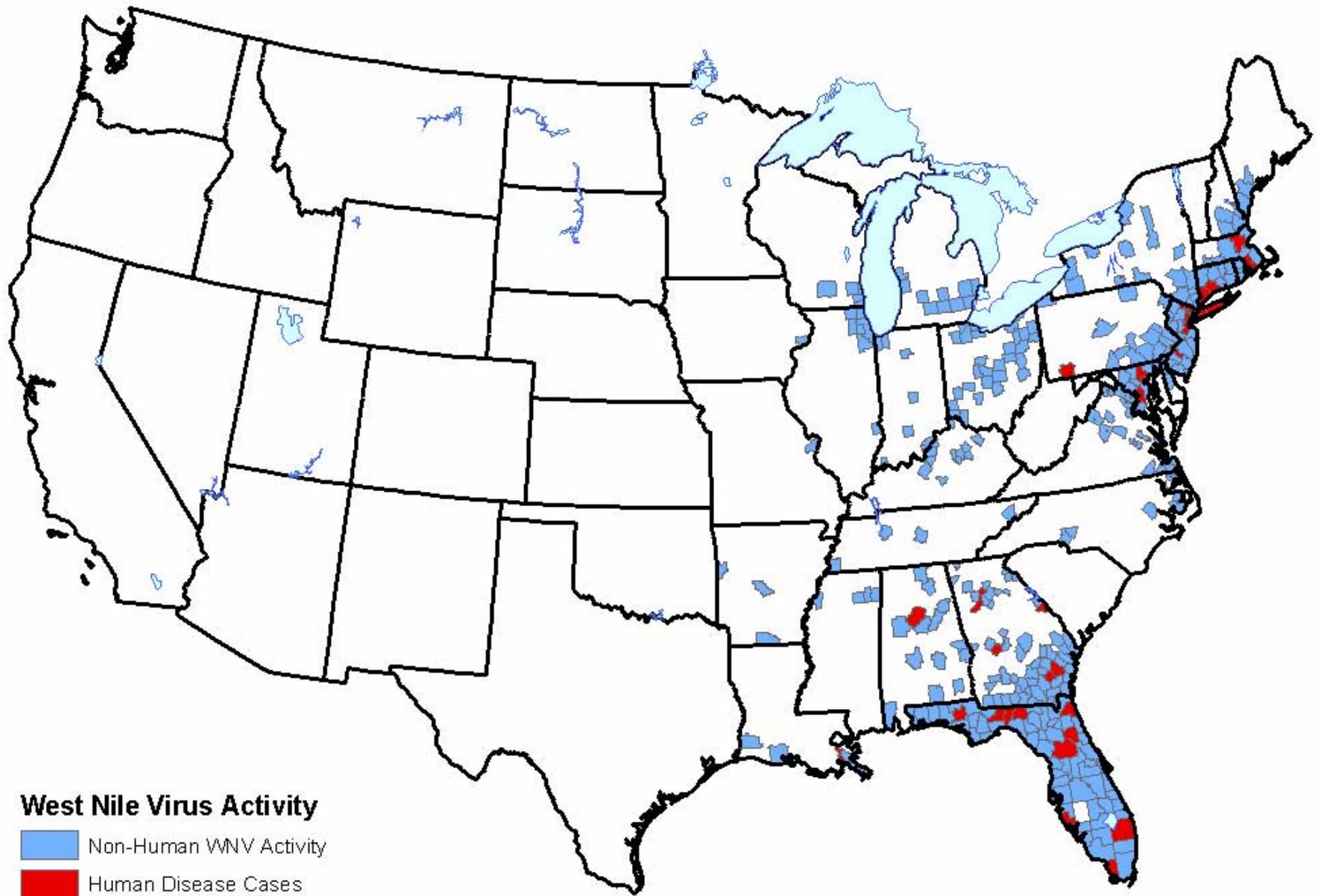
- Non-Human WNV Activity
- Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 2000 calendar year



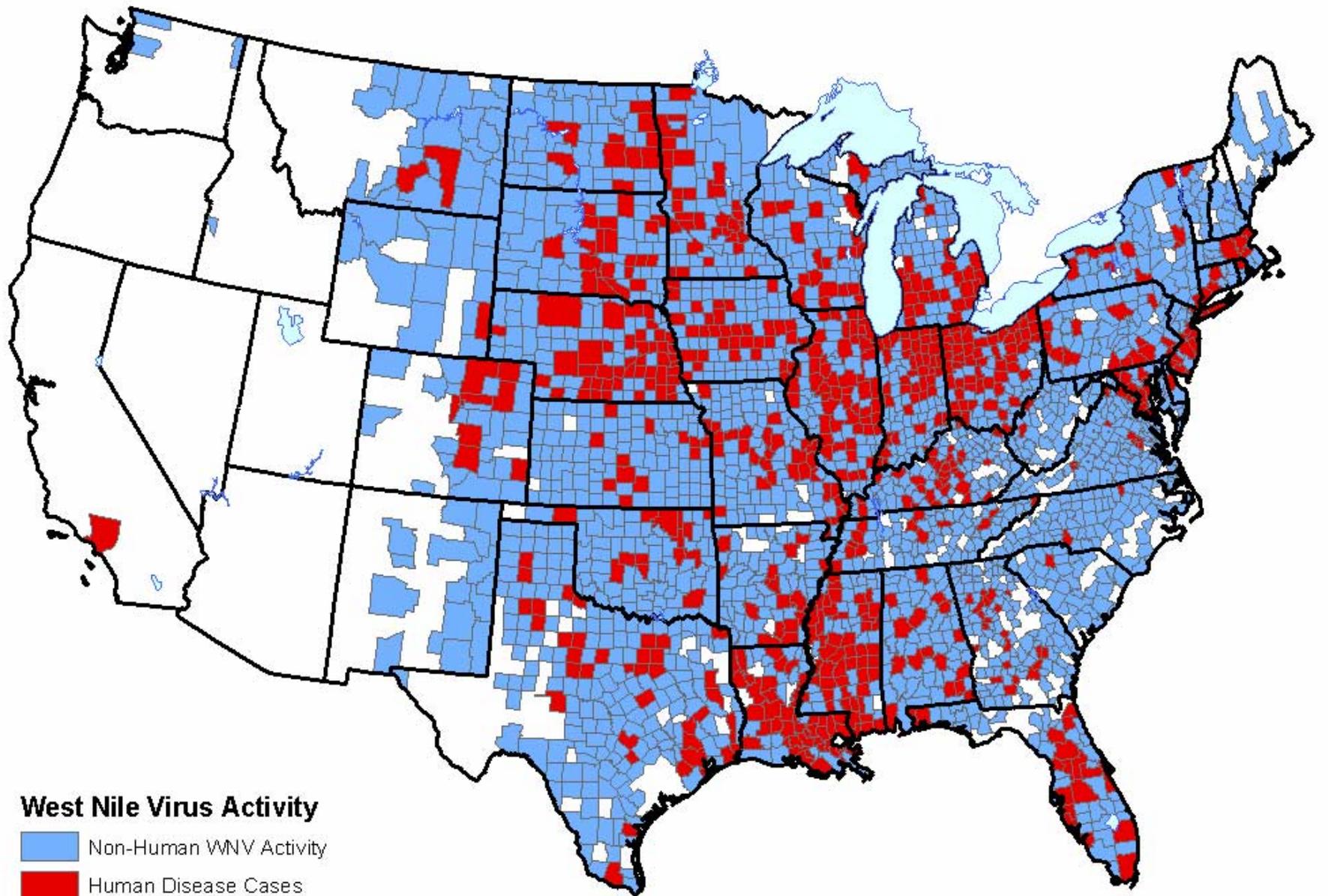


West Nile Virus Activity

-  Non-Human WNV Activity
-  Human Disease Cases

National Center for Infectious Diseases
West Nile Virus Activity
Cumulative results for 2001 calendar year

CDC



West Nile Virus Activity

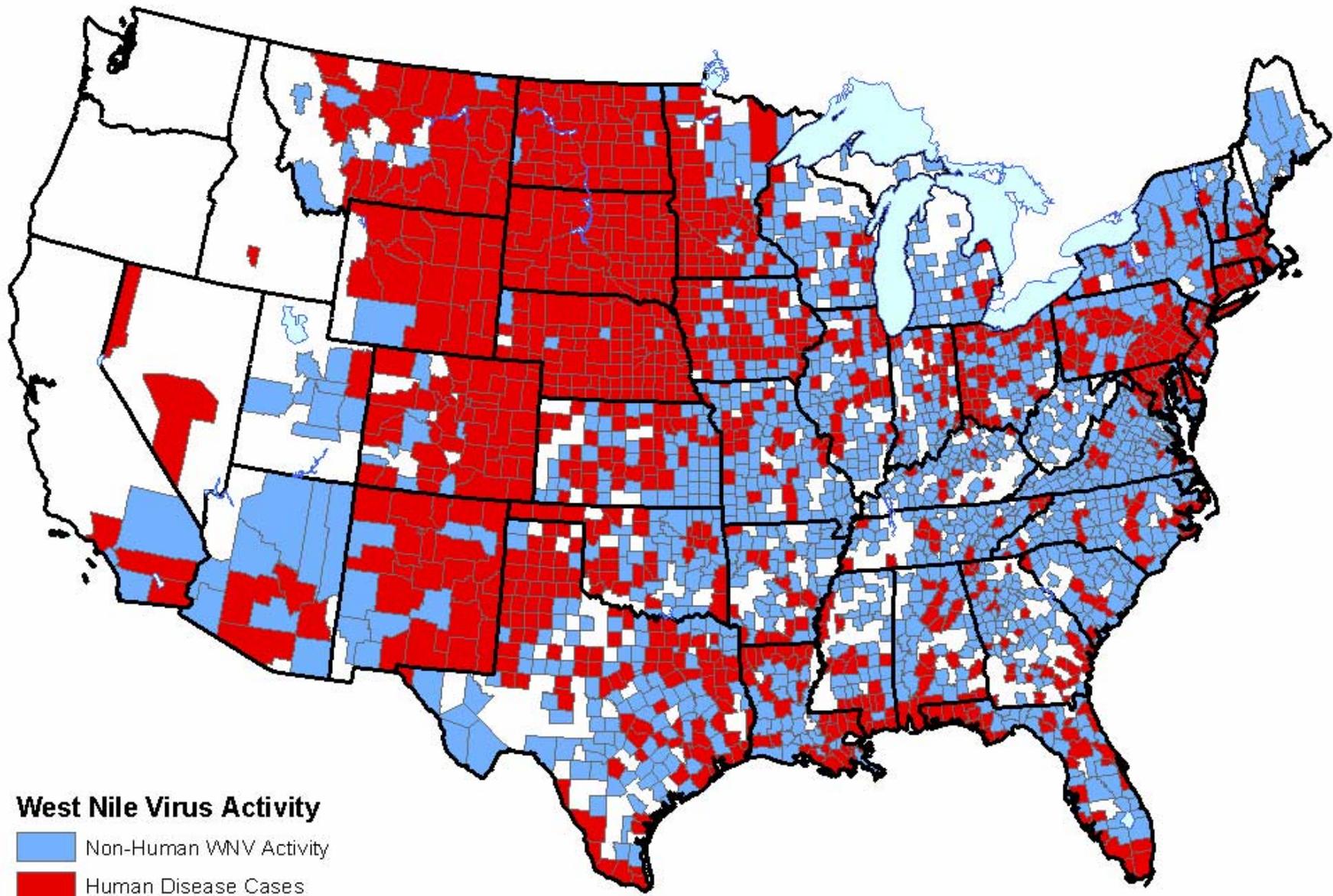
-  Non-Human WNV Activity
-  Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 2002 calendar year reported as of April 15, 2003

CDC



West Nile Virus Activity

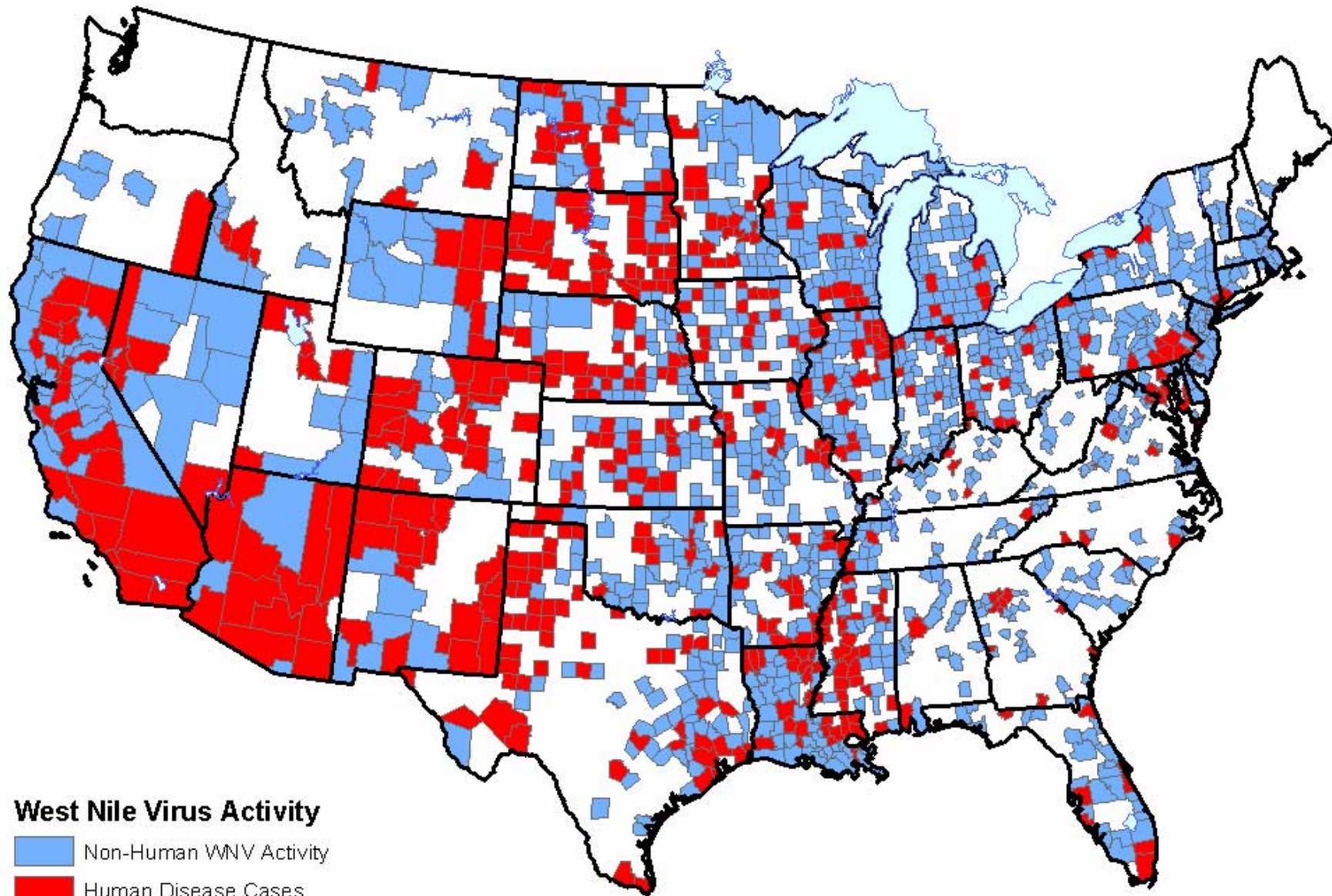
-  Non-Human WNV Activity
-  Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 2003 calendar year reported as of May 20, 2004





West Nile Virus Activity

- Non-Human WNV Activity
- Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 2004 calendar year reported as of January 11, 2005

CDC

MOSQUITOES

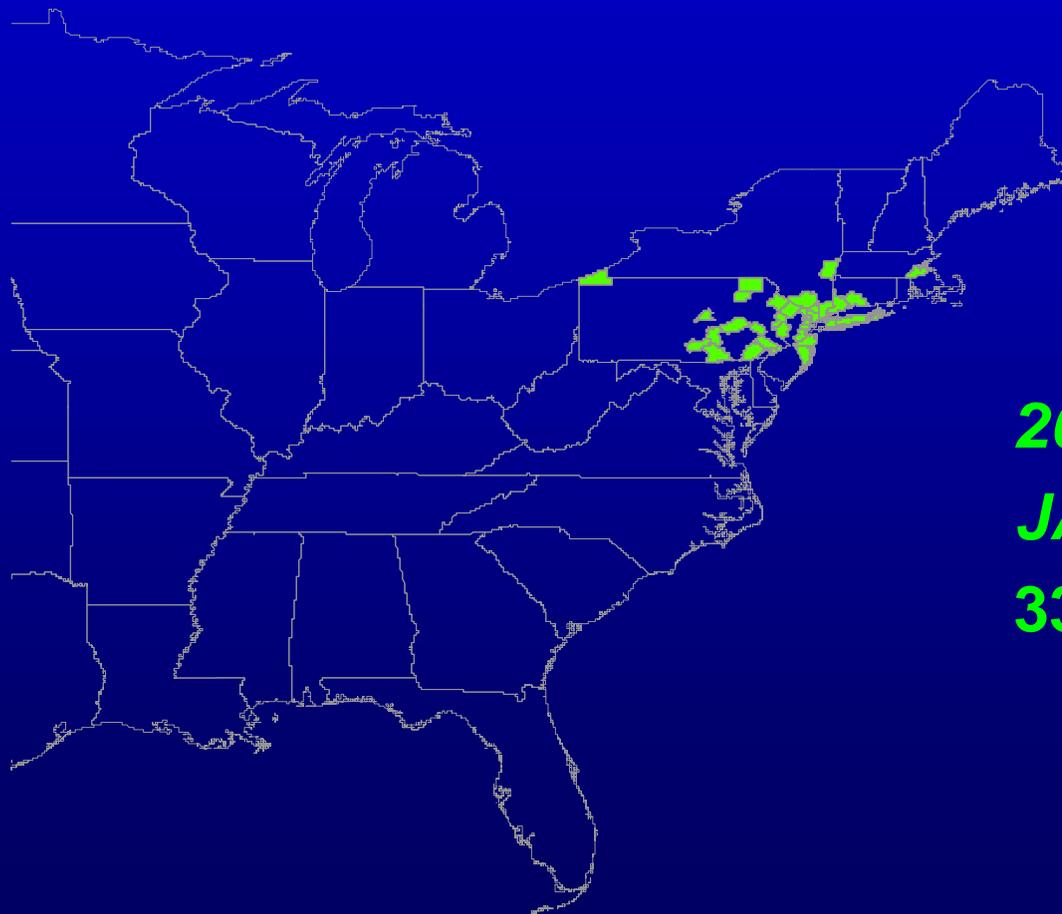
U.S. Counties Reporting WNV-Positive Mosquitoes



1999

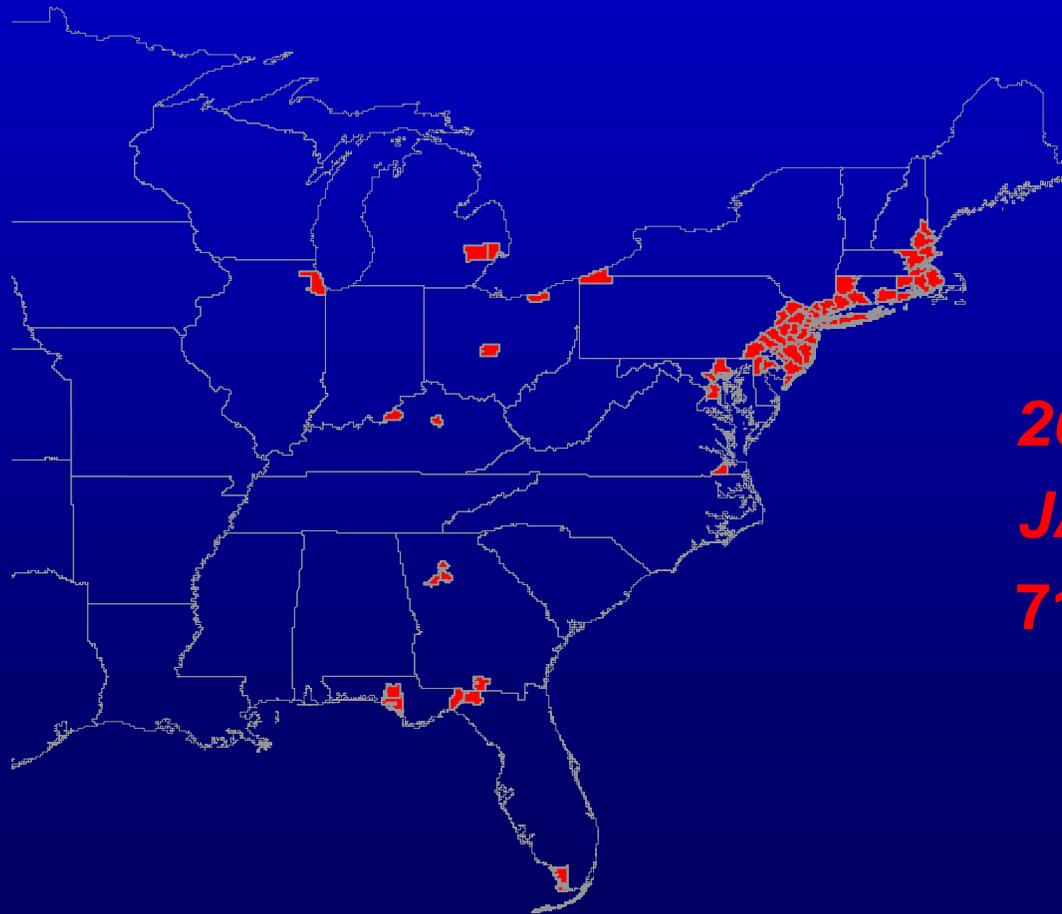
8 counties

U.S. Counties Reporting WNV-Positive Mosquitoes



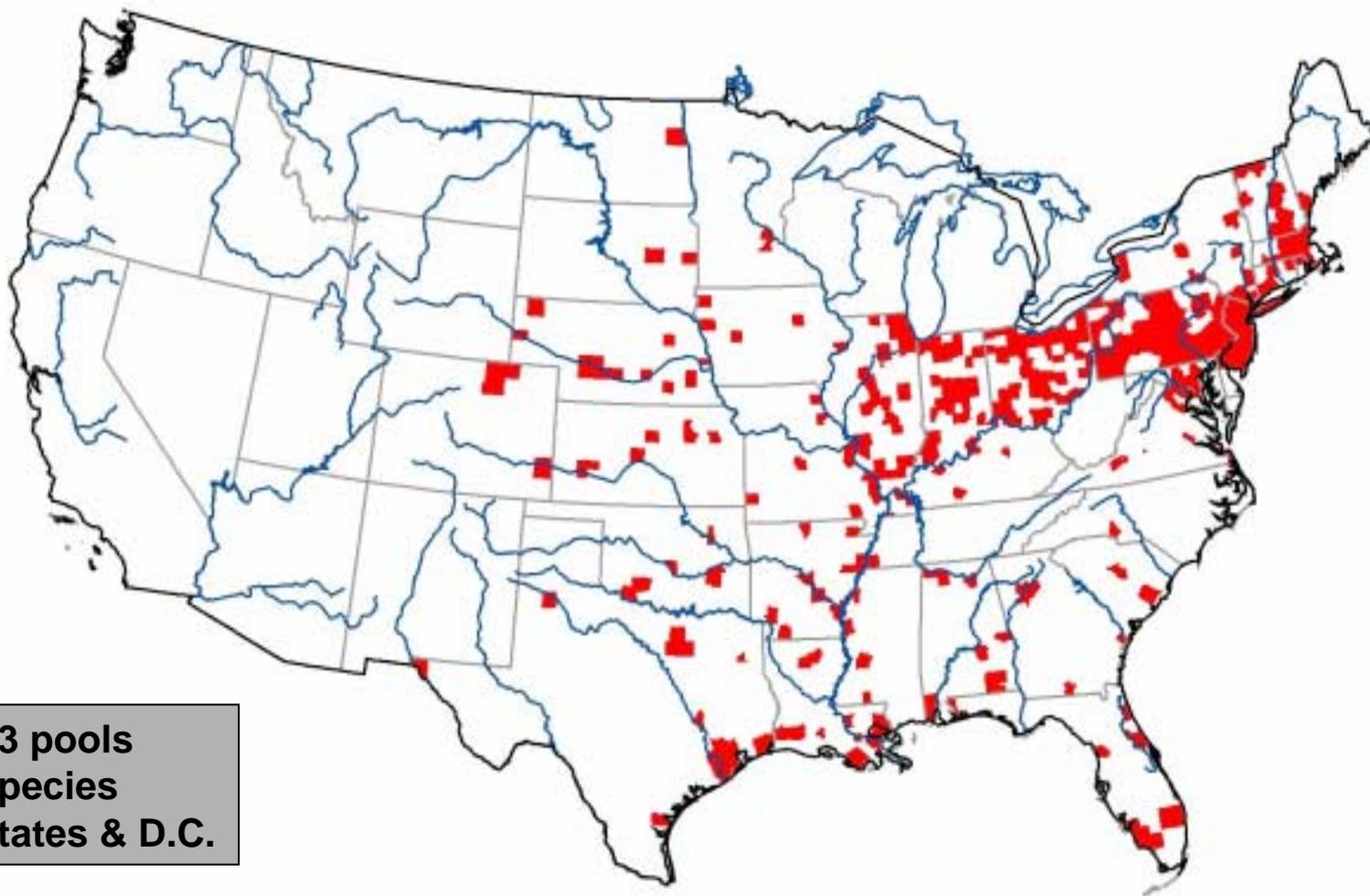
2000
JAN - DEC
33 counties

U.S. Counties Reporting WNV-Positive Mosquitoes



2001
JAN - DEC
71 counties

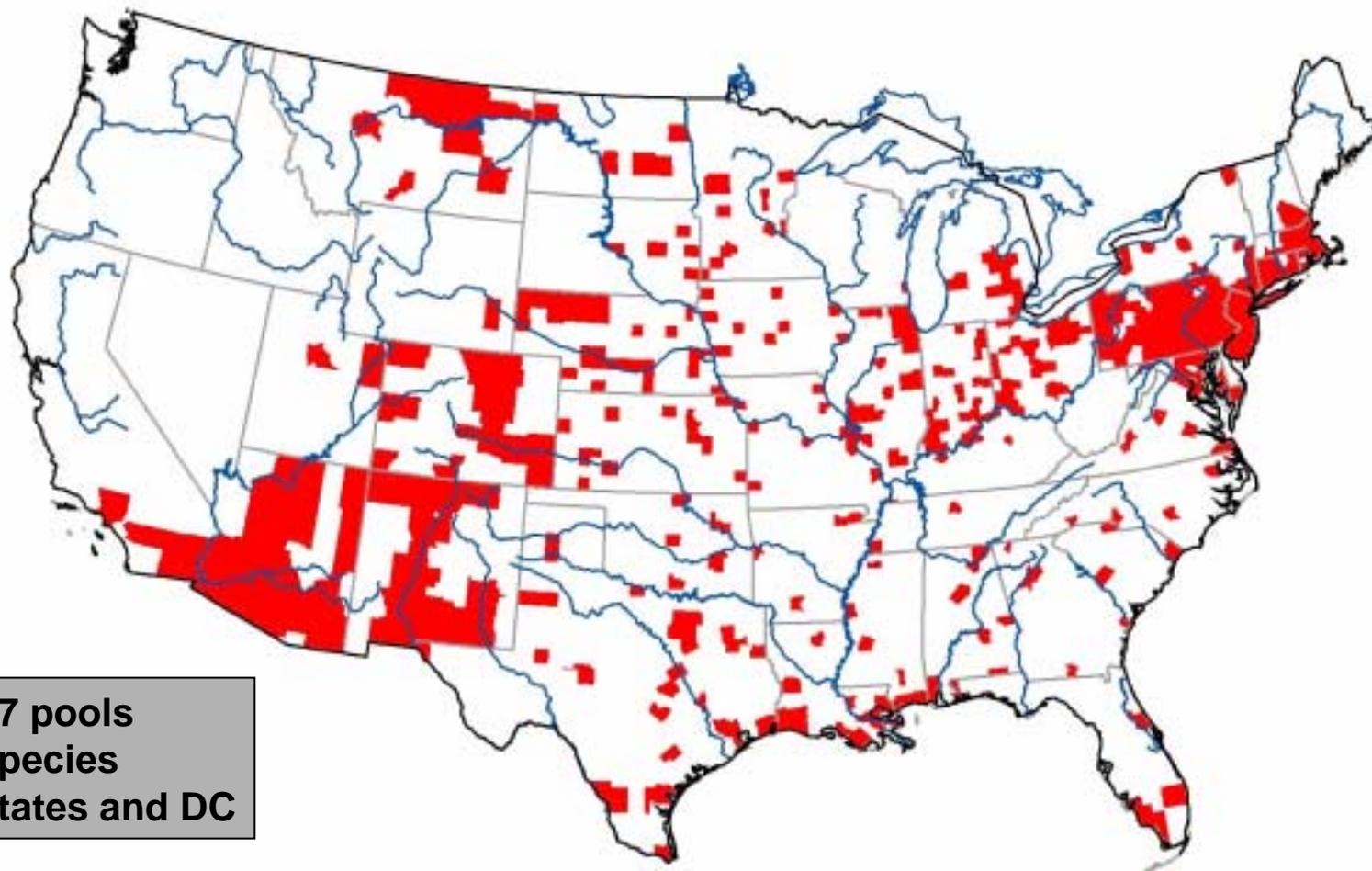
U.S. Counties Reporting WNV-Positive Mosquitoes, 2002



6,033 pools
29 species
33 states & D.C.

Through MMWR week 53 (ending 12/31/2002) - 367 counties

U.S. Counties Reporting WNV-Positive Mosquitoes, 2003

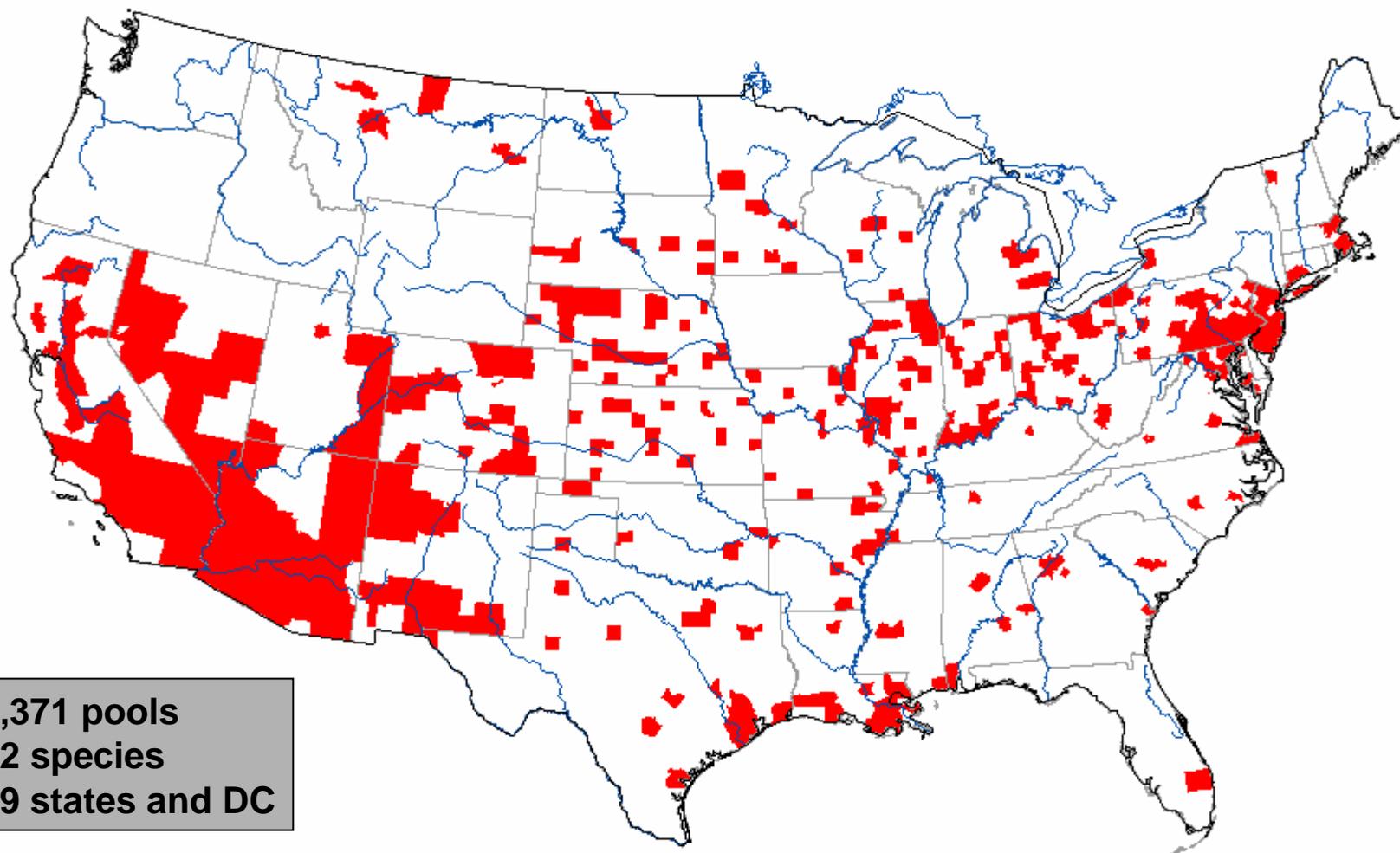


7,847 pools
37 species
38 states and DC

Through MMWR week 53 (ending 12/31/2003) - 494 counties

CDC/NCID/DVBID

U.S. Counties Reporting WNV-Positive Mosquitoes, 2004



8,371 pools
42 species
39 states and DC

Through MMWR week 52 (ending 12/31/2004) - 412 counties
Reported and published through ArboNET as of 1/11/2005

CDC/NCID/DVBID

WNV Surveillance, United States, 2004: Summary of Mosquito Data

- 2.1 million individual mosquitoes tested
- 8,371 WNV-positive mosquito pools
- Earliest:
 - *Culex pipiens*
 - February 10 in Union Co., PA
- Latest
 - *Cx. salinarius*
 - November 16 in Saint Bernard Parish, LA

“Top 10” WNV-Positive Mosquito Species Reported, By Number of WNV-Positive Pools, United States, 2001-2004*

| 2001 | 2002 | 2003 | 2004 |
|-----------------------------|-----------------------------|------------------------------|------------------------------|
| <i>Cx. pipiens</i> (349) | <i>Cx. species</i> (2124) | <i>Cx. species</i> (1904) | <i>Cx. quinq</i> (2484) |
| <i>Cx. species</i> (184) | <i>Cx. pipiens</i> (1536) | <i>Cx. tarsalis</i> (1746) | <i>Cx. species</i> (2481) |
| <i>Cx. pip/rest</i> (119) | <i>Cx. pip/rest</i> (1186) | <i>Cx. pipiens</i> (1157) | <i>Cx. tarsalis</i> (974) |
| <i>Cx. restuans</i> (76) | <i>Cx. quinq</i> (625) | <i>Cx. quinq</i> (1060) | <i>Cx. pip/rest</i> (670) |
| <i>Cx. salinarius</i> (70) | <i>Cx. restuans</i> (298) | <i>Cx. restuans</i> (850) | <i>Cx. pipiens</i> (602) |
| <i>Cs. melanura</i> (26) | <i>Cx. tarsalis</i> (249) | <i>Cx. pip/rest</i> (625) | <i>Cx. pip complex</i> (281) |
| <i>Oc. triseriatus</i> (13) | <i>Cx. salinarius</i> (119) | <i>Cx. pip complex</i> (272) | <i>Cx. restuans</i> (211) |
| <i>Cx. quinq</i> (13) | <i>Ae. albopictus</i> (66) | <i>Cx. salinarius</i> (247) | <i>Cx. erythro</i> (173) |
| <i>Oc. japonicus</i> (8) | <i>Oc. triseriatus</i> (63) | <i>Ae. vexans</i> (126) | <i>Cx. salinarius</i> (98) |
| <i>Oc. sollicitans</i> (6) | <i>Ae. vexans</i> (62) | <i>Cs. melanura</i> (69) | <i>Other sp/Unknown</i> (95) |

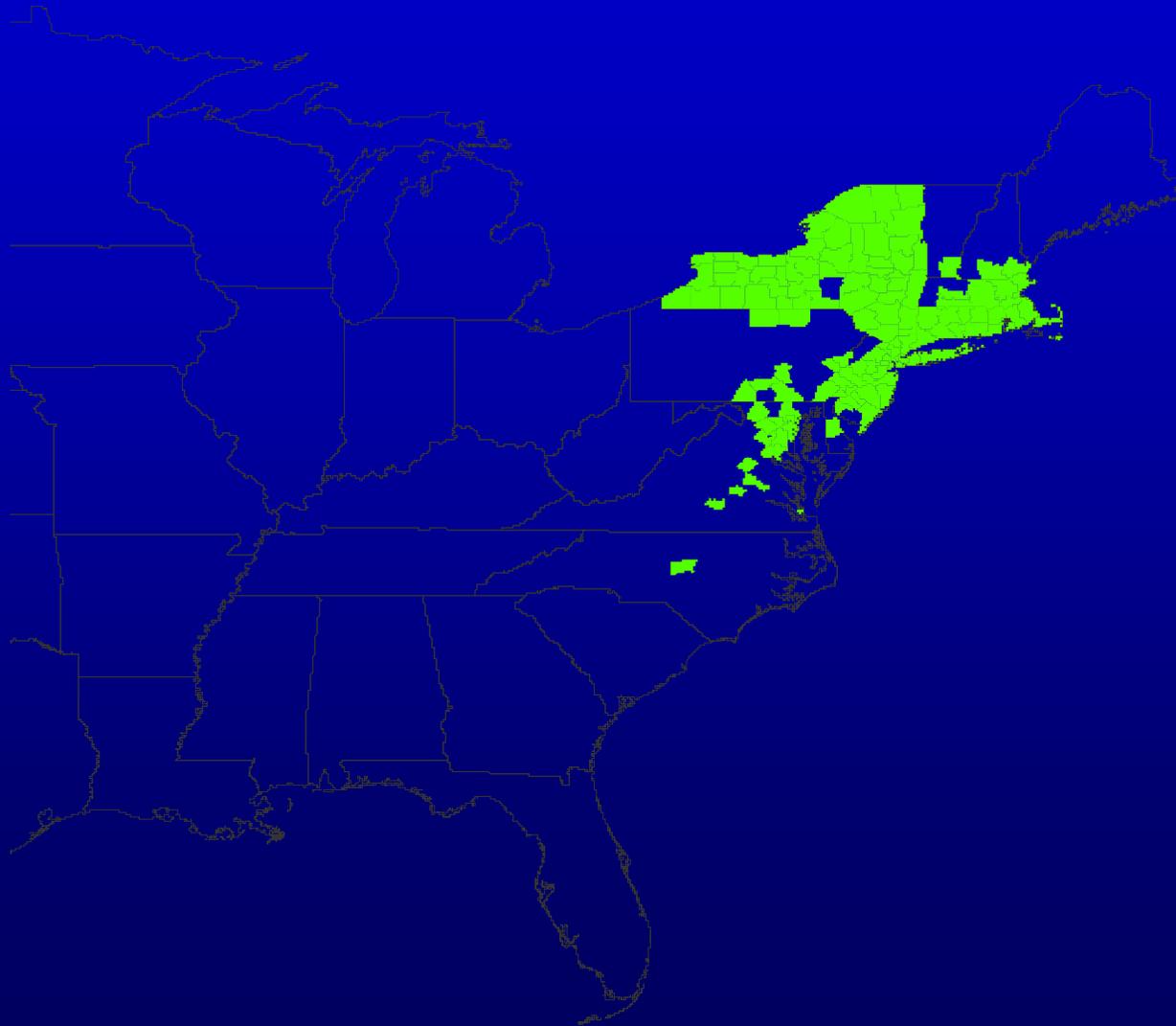
* Reported as of 1/11/2005

BIRDS

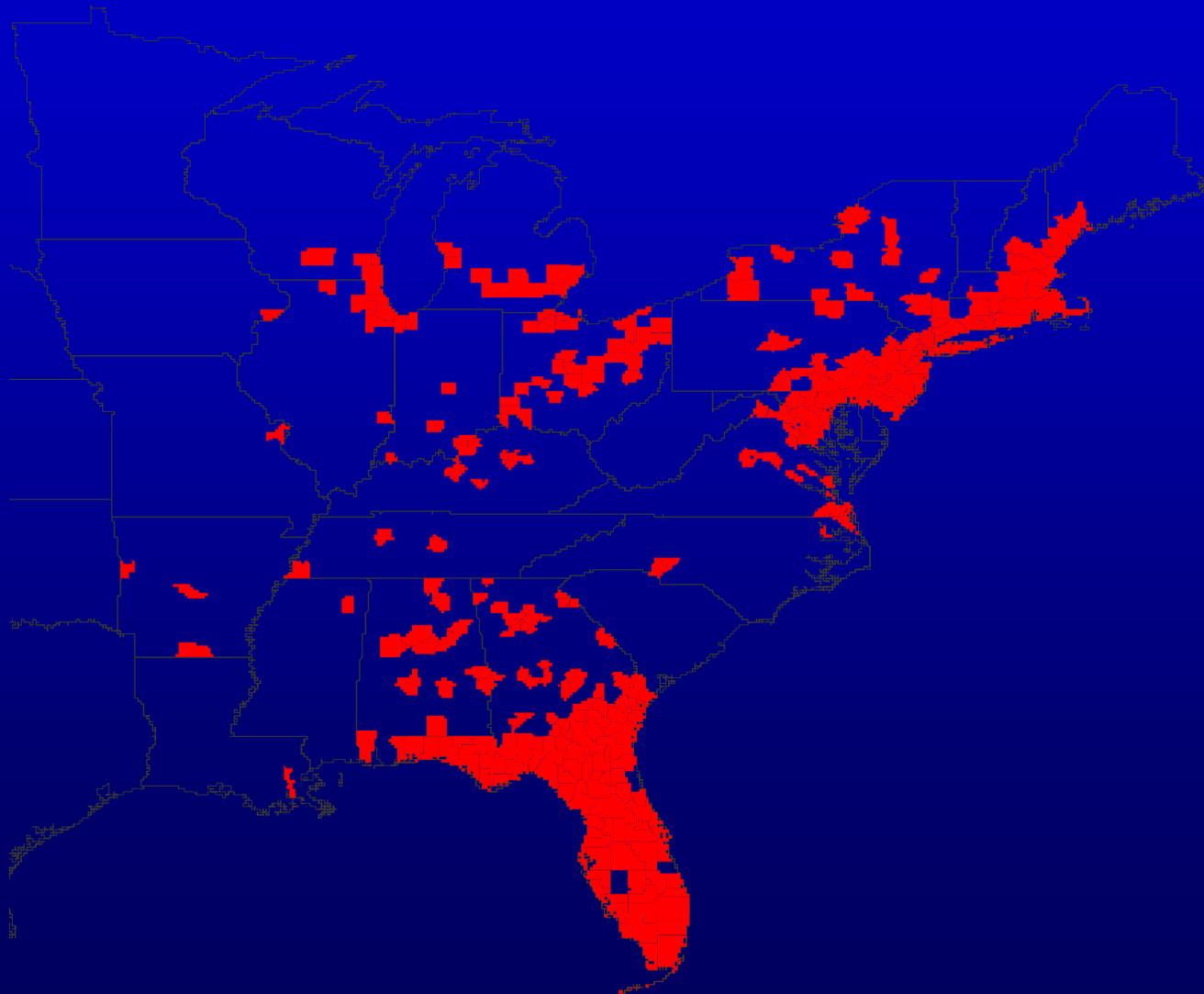
U.S. counties reporting any WNV-infected birds in 1999 (N = 28 counties)



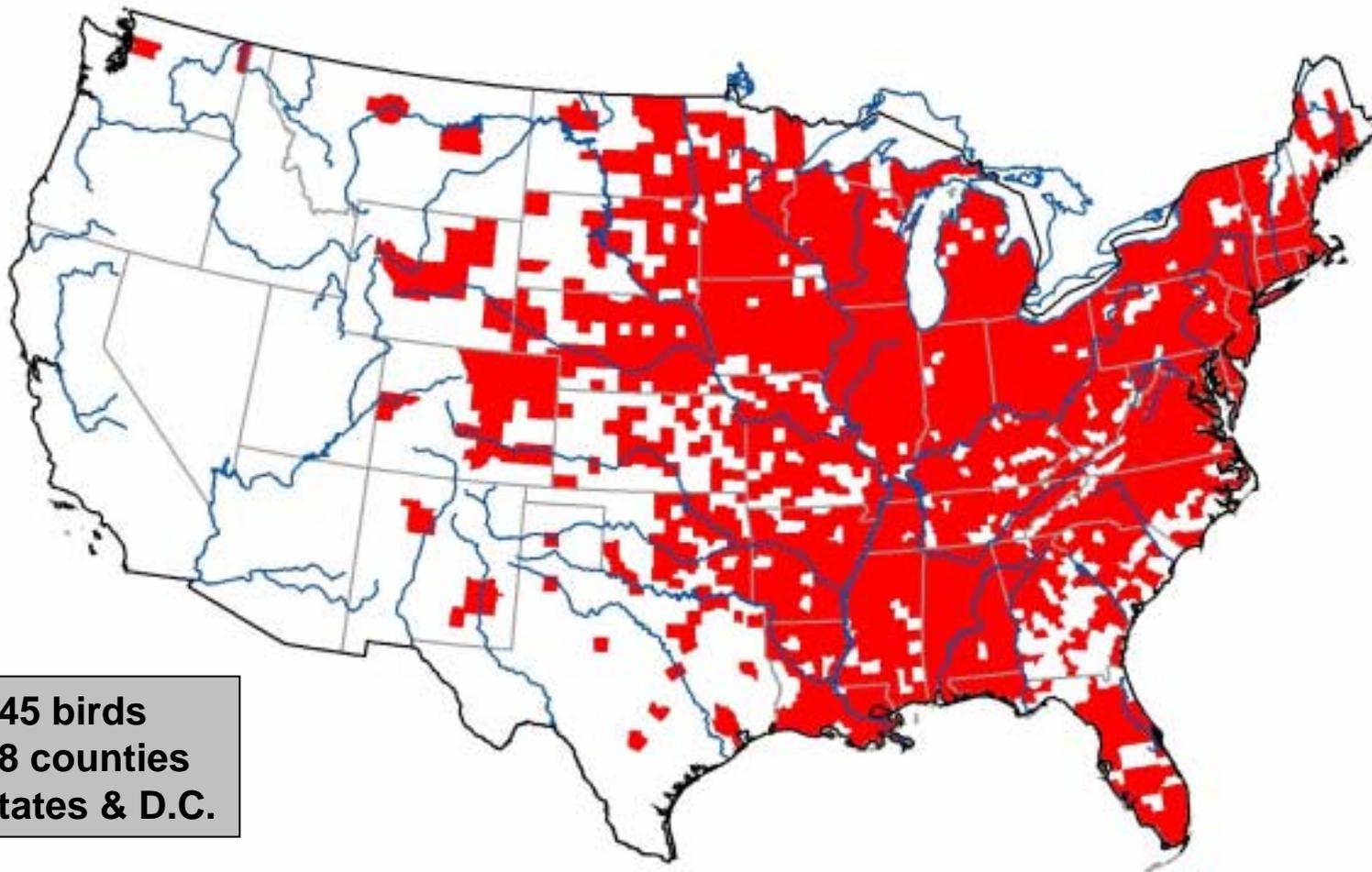
U.S. counties reporting any WNV-infected birds in 2000 (N = 136 counties)



U.S. counties reporting any WNV-infected birds in 2001 (N = 328 counties)



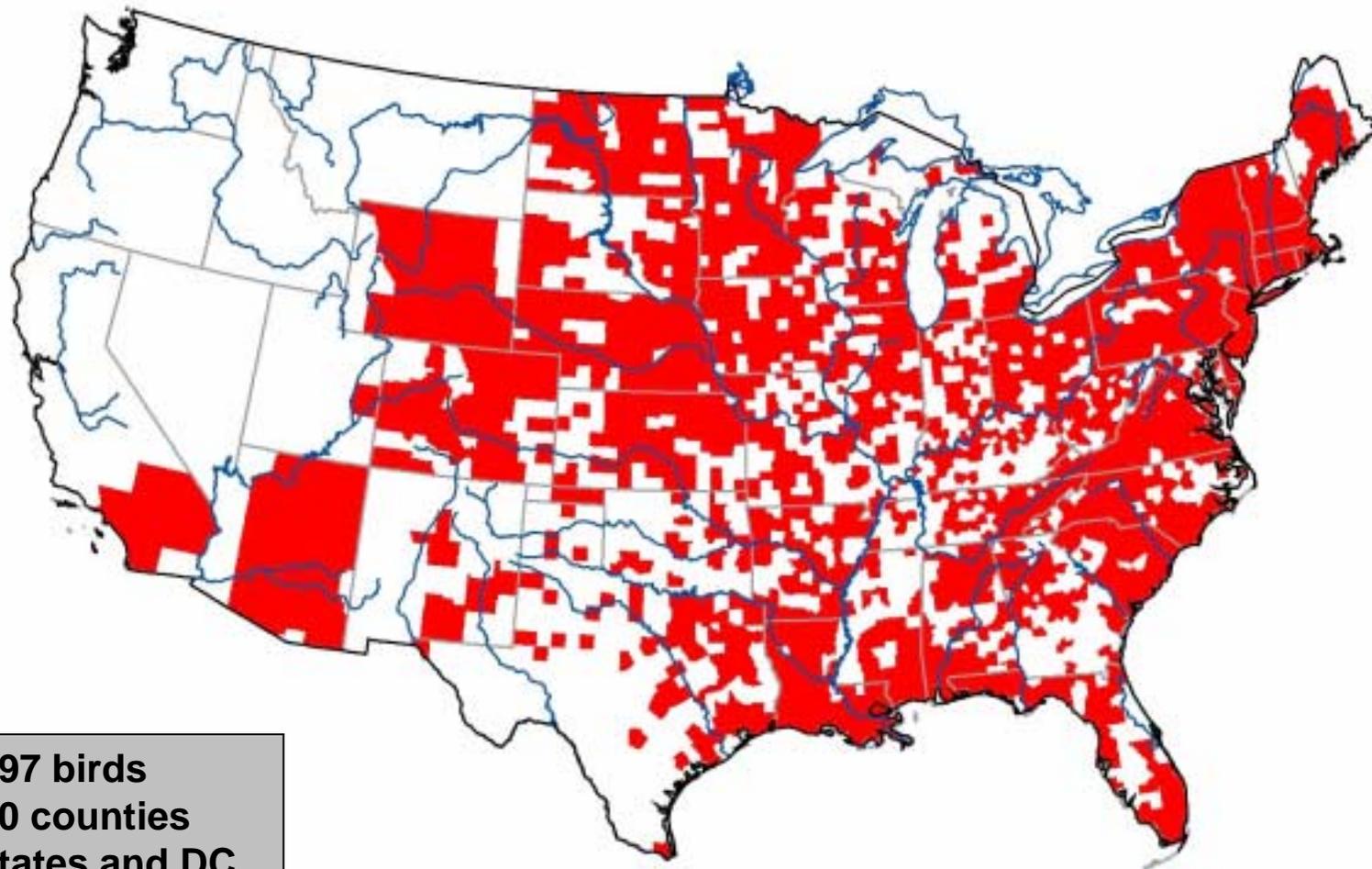
U.S. Counties Reporting WNV-Positive Dead Birds, 2002



15,745 birds
1,888 counties
42 states & D.C.

Through MMWR week 53 (ending 12/31/2002) - 1949 counties

U.S. Counties Reporting WNV-Positive Dead Birds, 2003

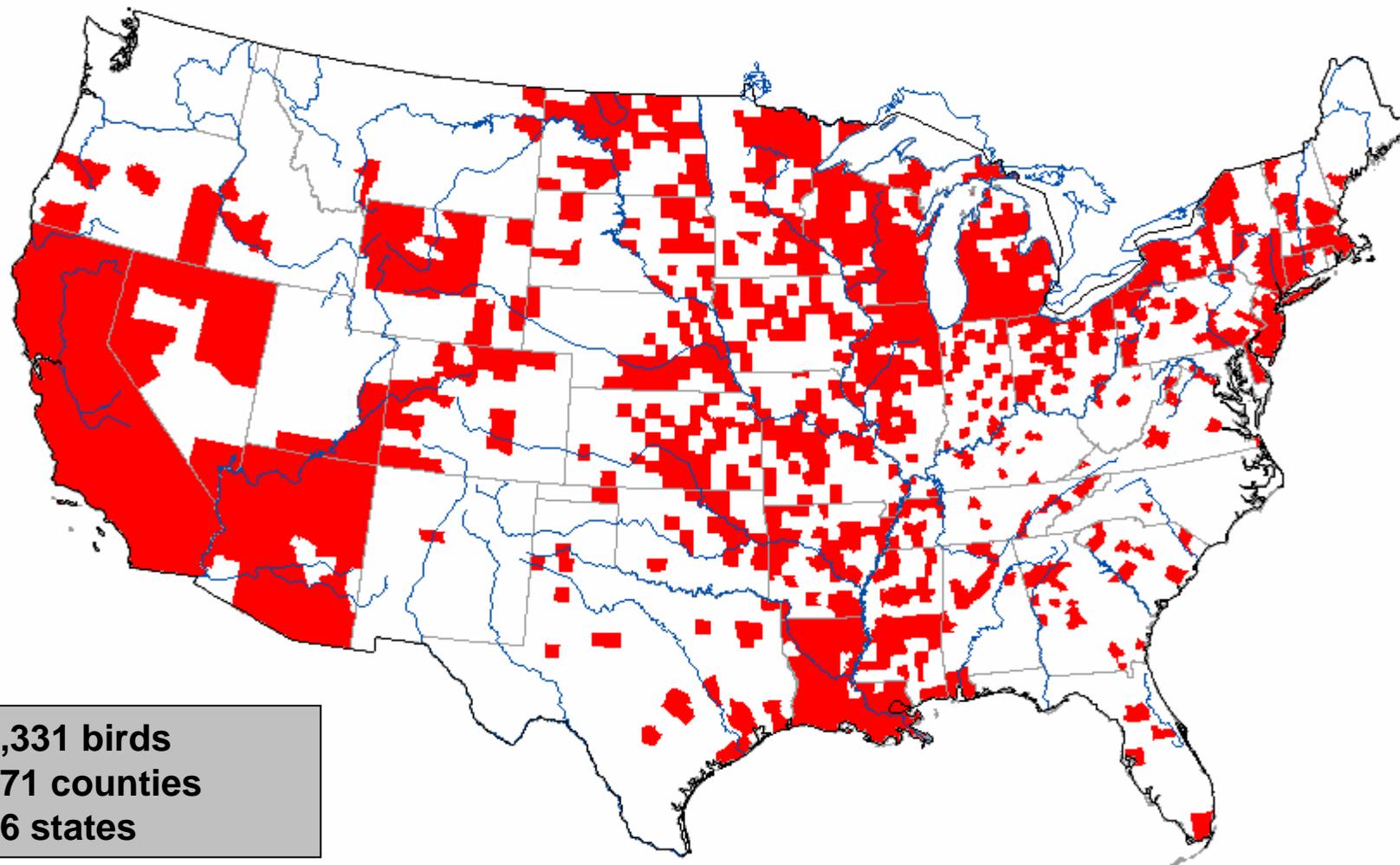


11,597 birds
1,640 counties
43 states and DC

Through MMWR week 53 (ending 12/31/2003) - 1689 counties

CDC/NCID/DVBID

U.S. Counties Reporting WNV-Positive Dead Birds, 2004



Through MMWR week 52 (ending 12/31/2004) - 971 counties
Reported and published through ArboNET as of 1/11/2005

CDC/NCID/DVBID

WNV Surveillance, United States, 2004*: Summary of Dead Bird Data

- 31,992 dead birds reported
- 12,379 tested (39%)
- 7,331 WNV-positive birds
 - 5,843 (80%) corvids
 - 1,488 (20%) other spp.

“Top Ten” WNV-Positive Bird Species Reported, United States, 2004*

| Species | # positive birds | % of Total |
|------------------------|------------------|------------|
| American Crow | 2637 | 36 |
| Blue Jay | 1826 | 25 |
| Western Scrub Jay | 626 | 9 |
| Yellow-Billed Magpie | 304 | 4 |
| House Sparrow | 282 | 4 |
| Crow Species | 242 | 3 |
| Other Species | 126 | 2 |
| Northern Cardinal | 115 | 2 |
| Steller's Jay | 73 | 1 |
| American White Pelican | 72 | 1 |

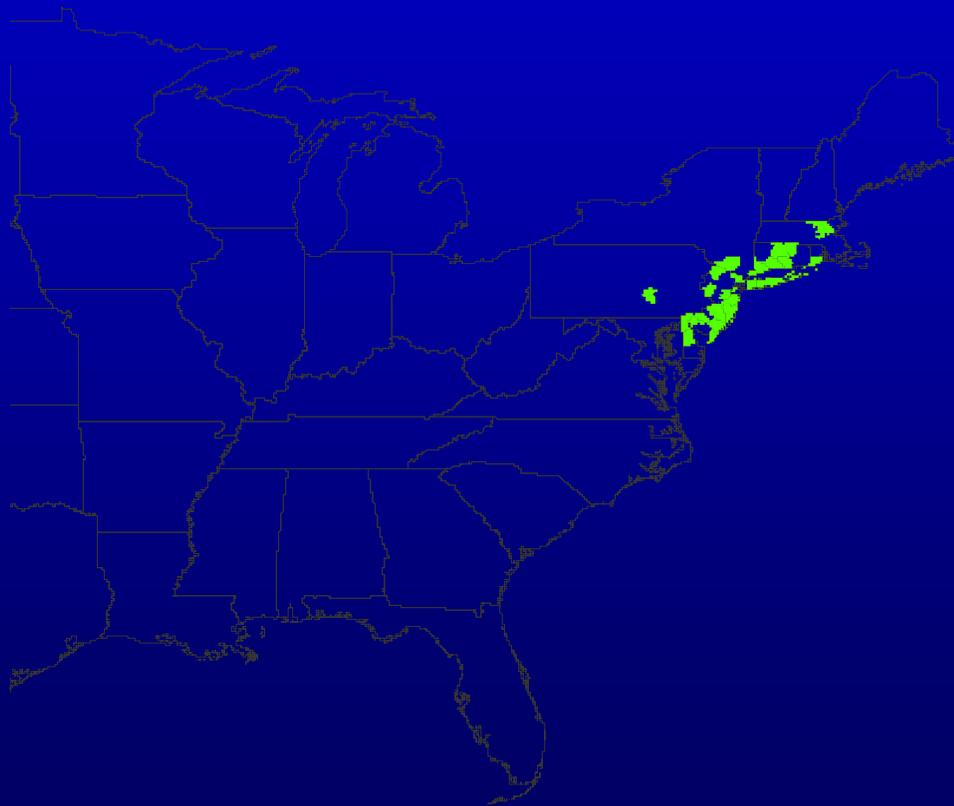
* Reported as of 1/11/2005

HORSES

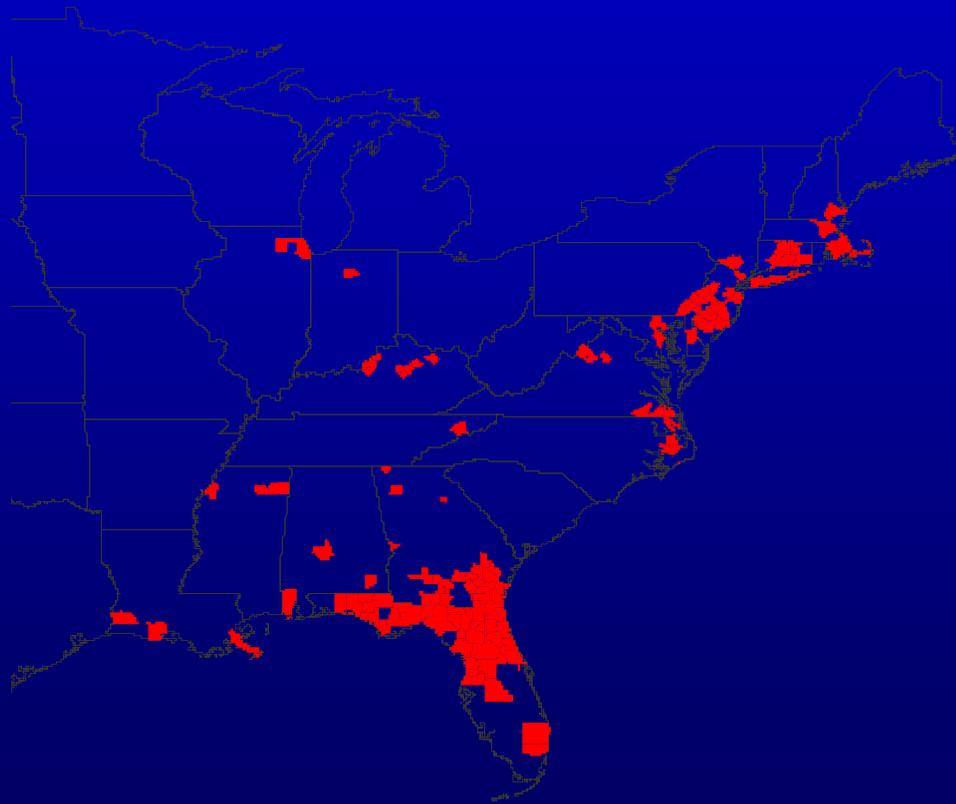
U.S. counties reporting equine WNV illnesses
1999 (N = 2 counties)



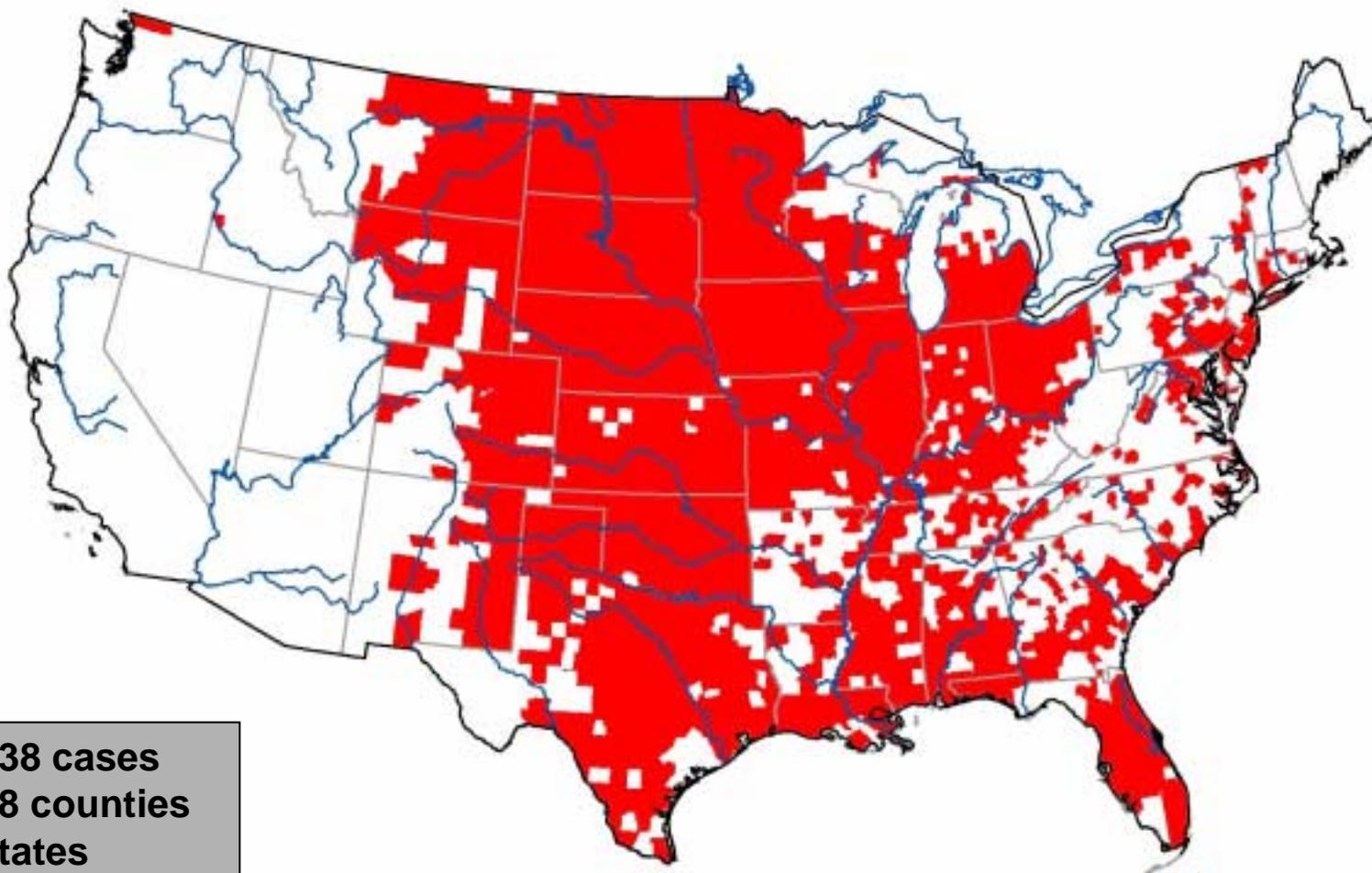
U.S. counties reporting equine WNV illnesses
Jan - Dec 2000 (N = 26 counties)



U.S. counties reporting **equine WNV** illnesses
Jan - Dec 2001 (N = 125 counties)



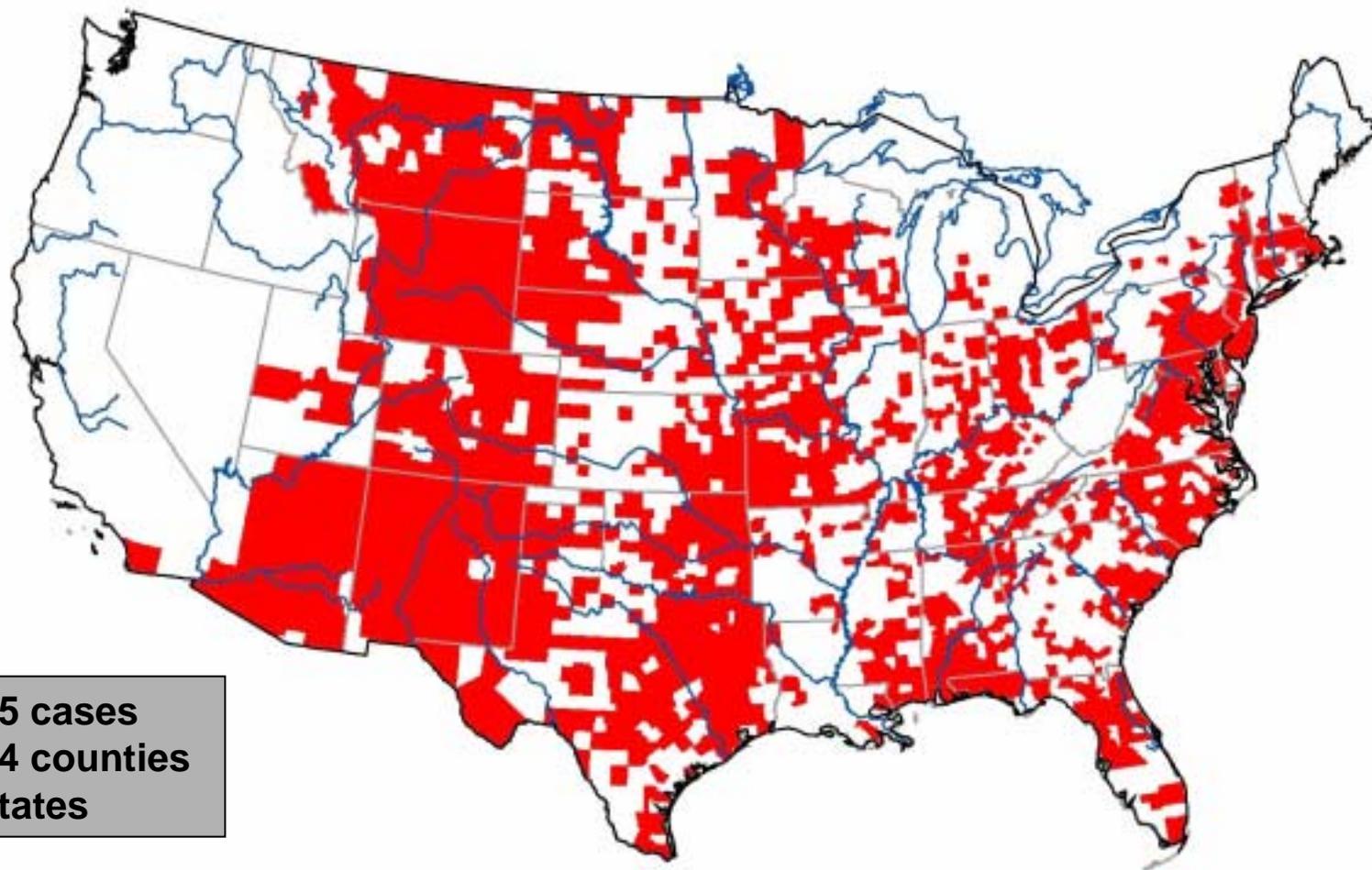
U.S. Counties Reporting Equine WNV Disease Cases, 2002



12,038 cases
1,678 counties
39 states

Through MMWR week 53 (ending 12/31/2002) - 1835 counties

U.S. Counties Reporting Equine WNV Disease Cases, 2003

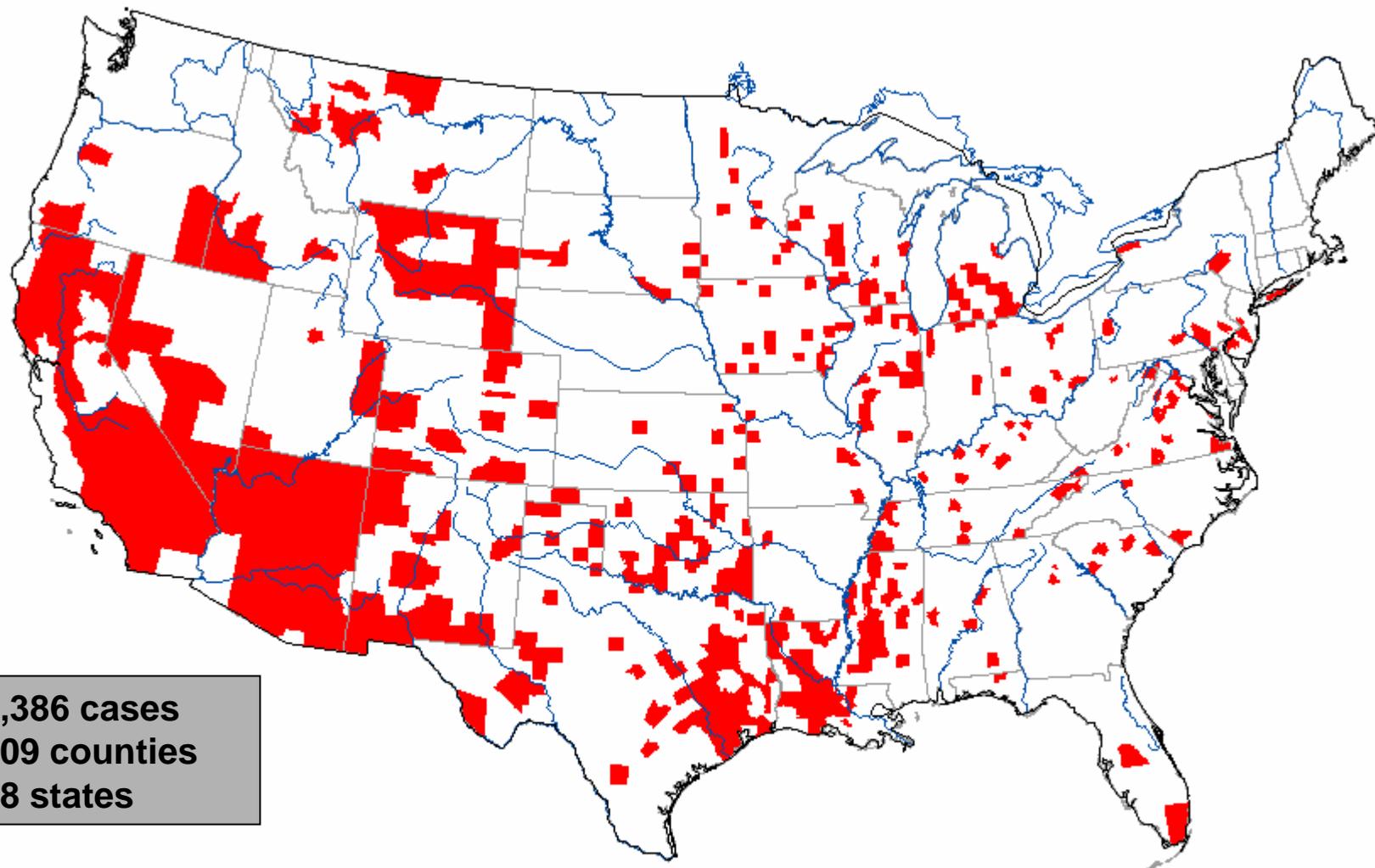


5,145 cases
1,294 counties
43 states

Through MMWR week 53 (ending 12/31/2003) - 1294 counties

CDC/NCID/DVBID

U.S. Counties Reporting Equine WNV Disease Cases, 2004



1,386 cases
409 counties
38 states

Through MMWR week 52 (ending 12/31/2004) - 409 counties
Reported and published through ArboNET as of 1/11/2005

CDC/NCID/DVBID

WNV-Infected Non-Human Mammals Reported, United States, 1999-2004*

| Species | # Infected 1999-2001 | # Infected 2002 | # Infected 2003 | # Infected 2004 |
|------------------|-------------------------|--------------------|--------------------|--------------------|
| Equine | 821 | 14,571 | 5,145 | 1,386 |
| Squirrel | 1 | 9 | 20 | 7 |
| Canine | 0 | 7 | 37 | 10 |
| Cat | 1 | 1 | 1 | 0 |
| Sheep | 0 | 1 | 0 | 0 |
| Domestic rabbit | 1 | 0 | 0 | 0 |
| Eastern chipmunk | 1 | 0 | 0 | 0 |
| Striped skunk | 1 | 0 | 0 | 0 |
| Bat | 2 | 0 | 0 | 1 |
| Other | 3 | 14 | 48 | 15 |

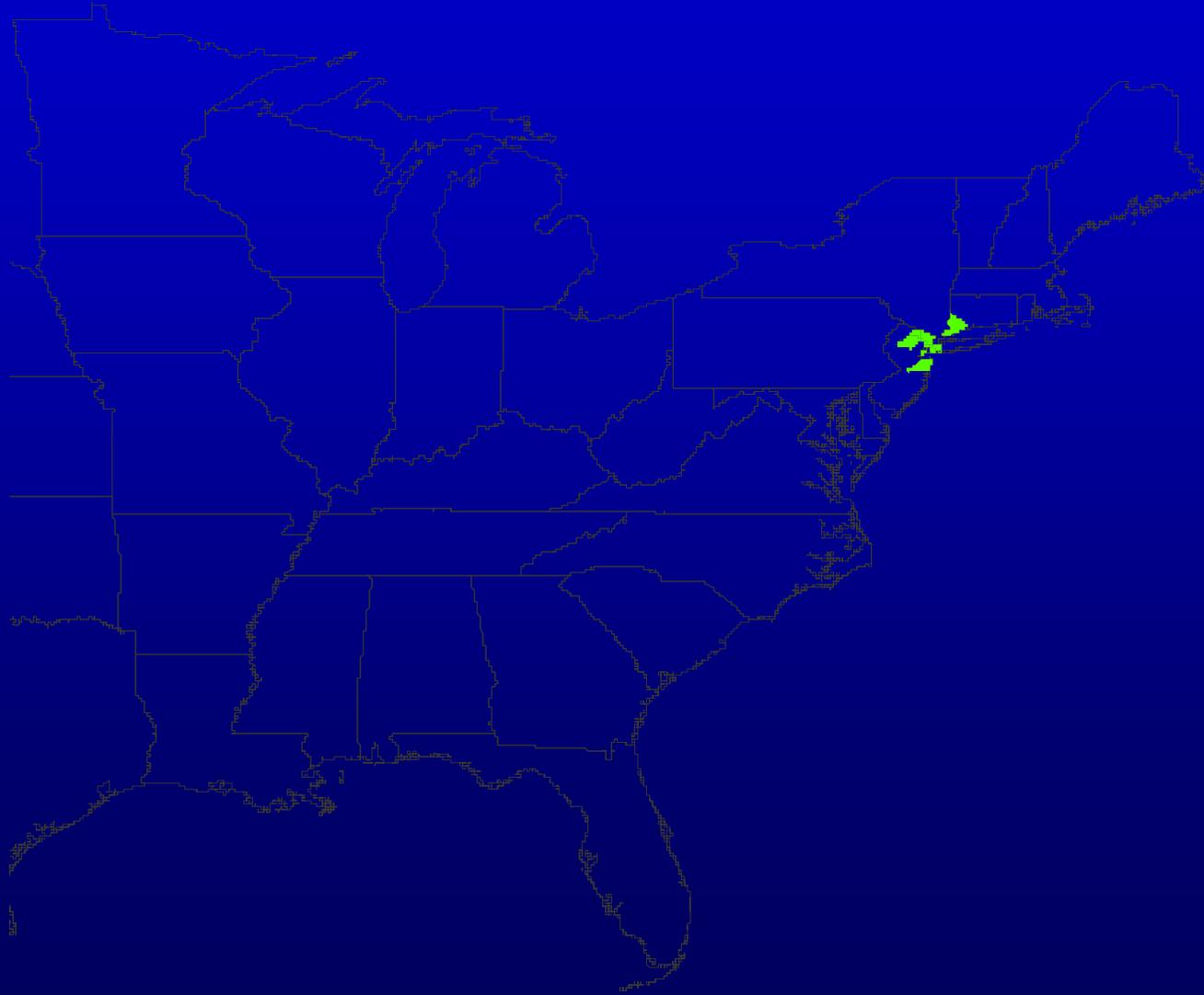
* Reported as of 1/11/2005

HUMANS

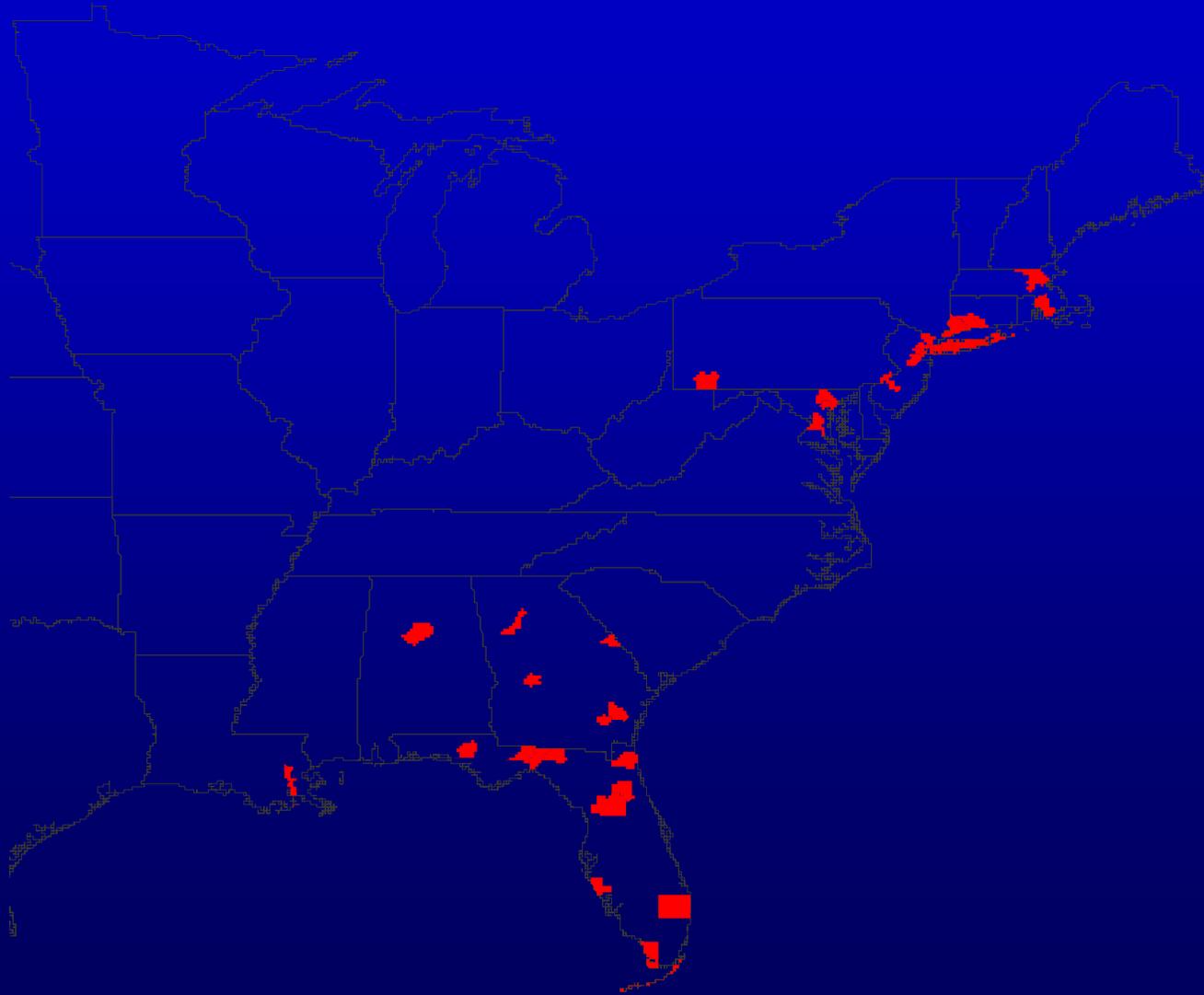
U.S. counties reporting human WNV disease cases, 1999 (N = 6 counties)



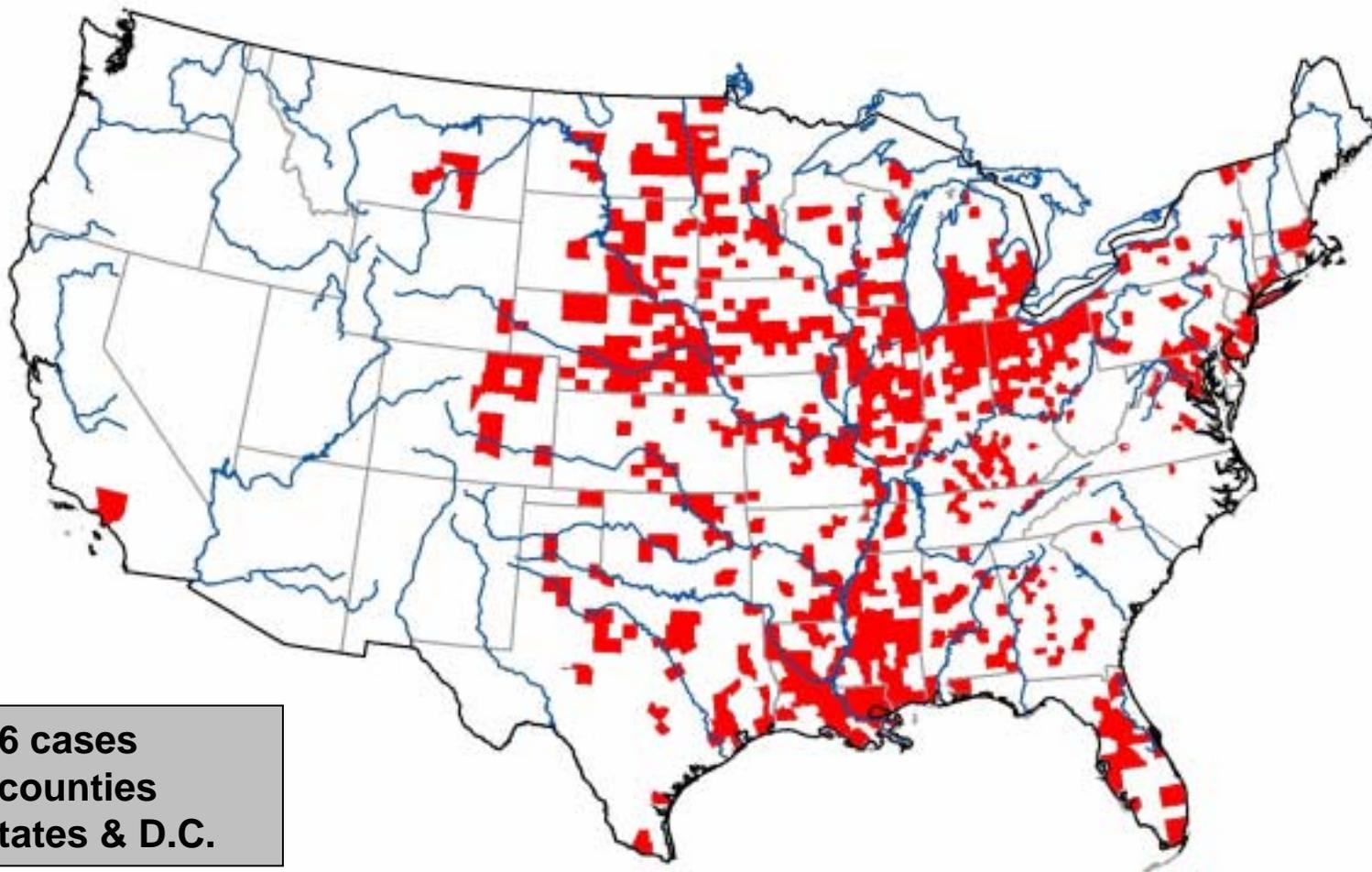
U.S. counties reporting **human** WNV disease cases, **2000** (N = 10 counties)



U.S. counties reporting **human** WNV disease cases, **2001** (N = 39 counties)



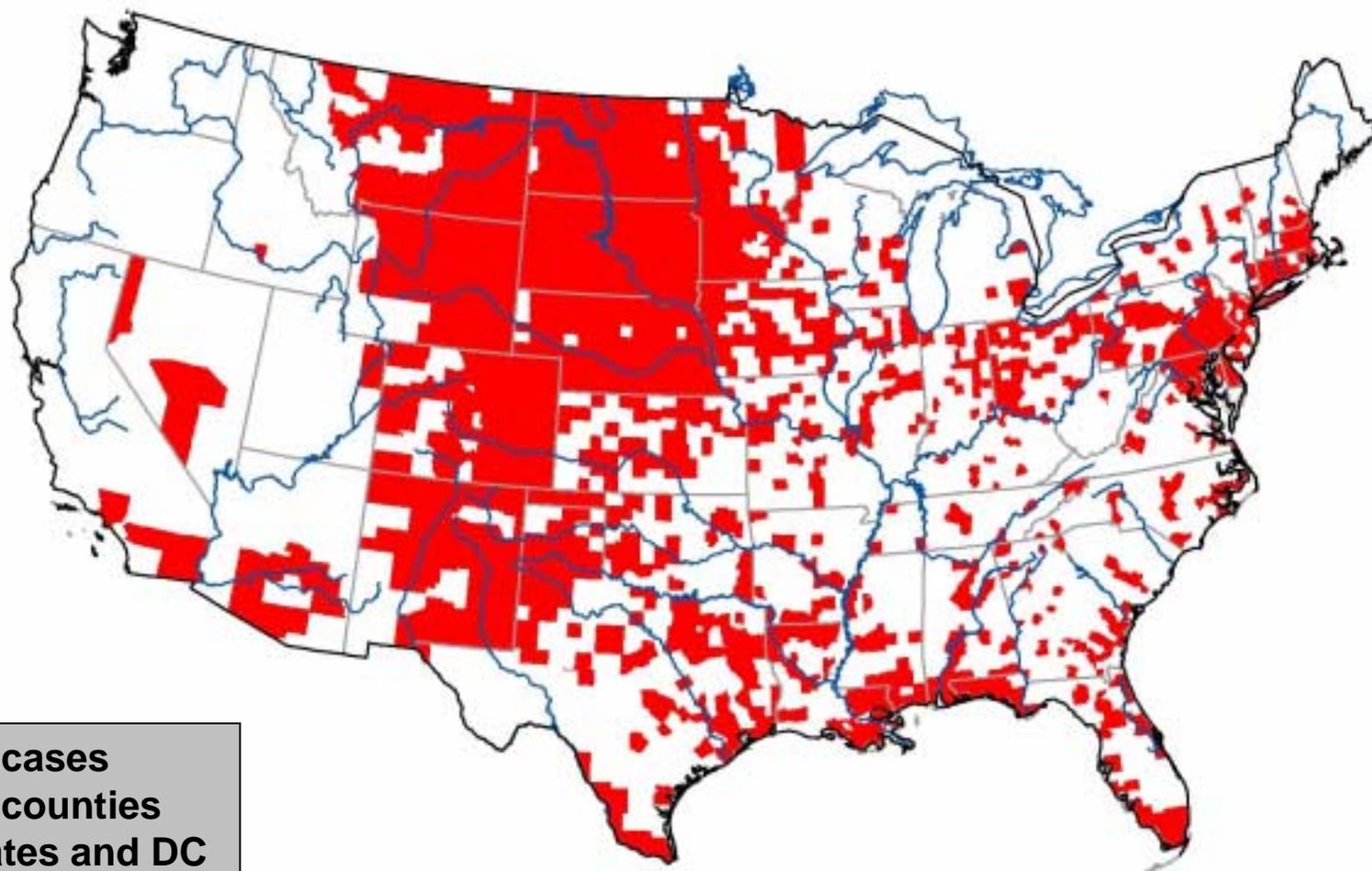
U.S. Counties Reporting Human WNV Disease Cases, 2002



4,156 cases
740 counties
39 states & D.C.

Through MMWR week 53 (ending 12/31/2002) - 742 counties

U.S. Counties Reporting Human WNV Disease Cases, 2003

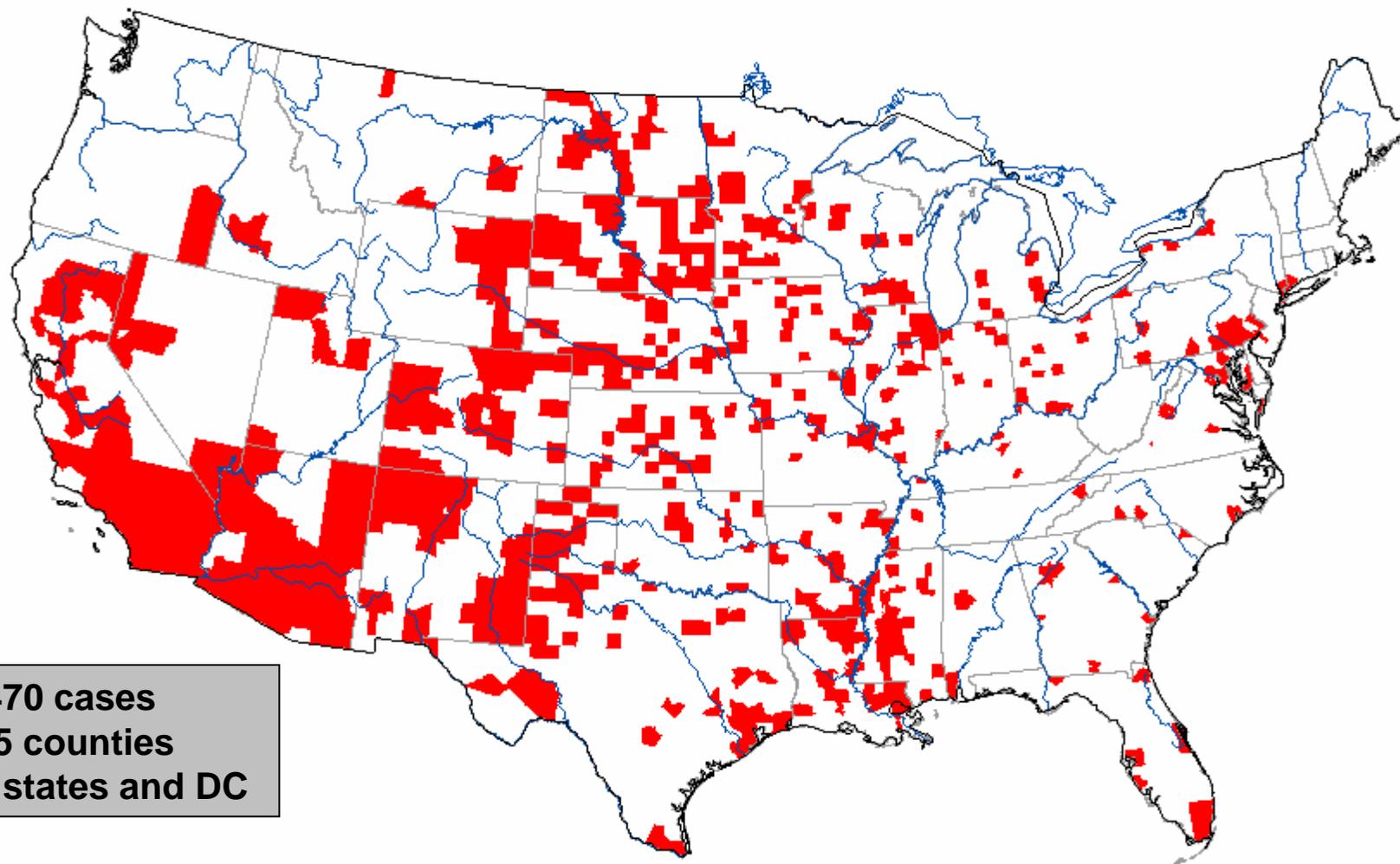


9,862 cases
1,079 counties
45 states and DC

Through MMWR week 53 (ending 12/31/2003) - 1079 counties

CDC/NCID/DVBID

U.S. Counties Reporting Human WNV Disease Cases, 2004



2,470 cases
505 counties
40 states and DC

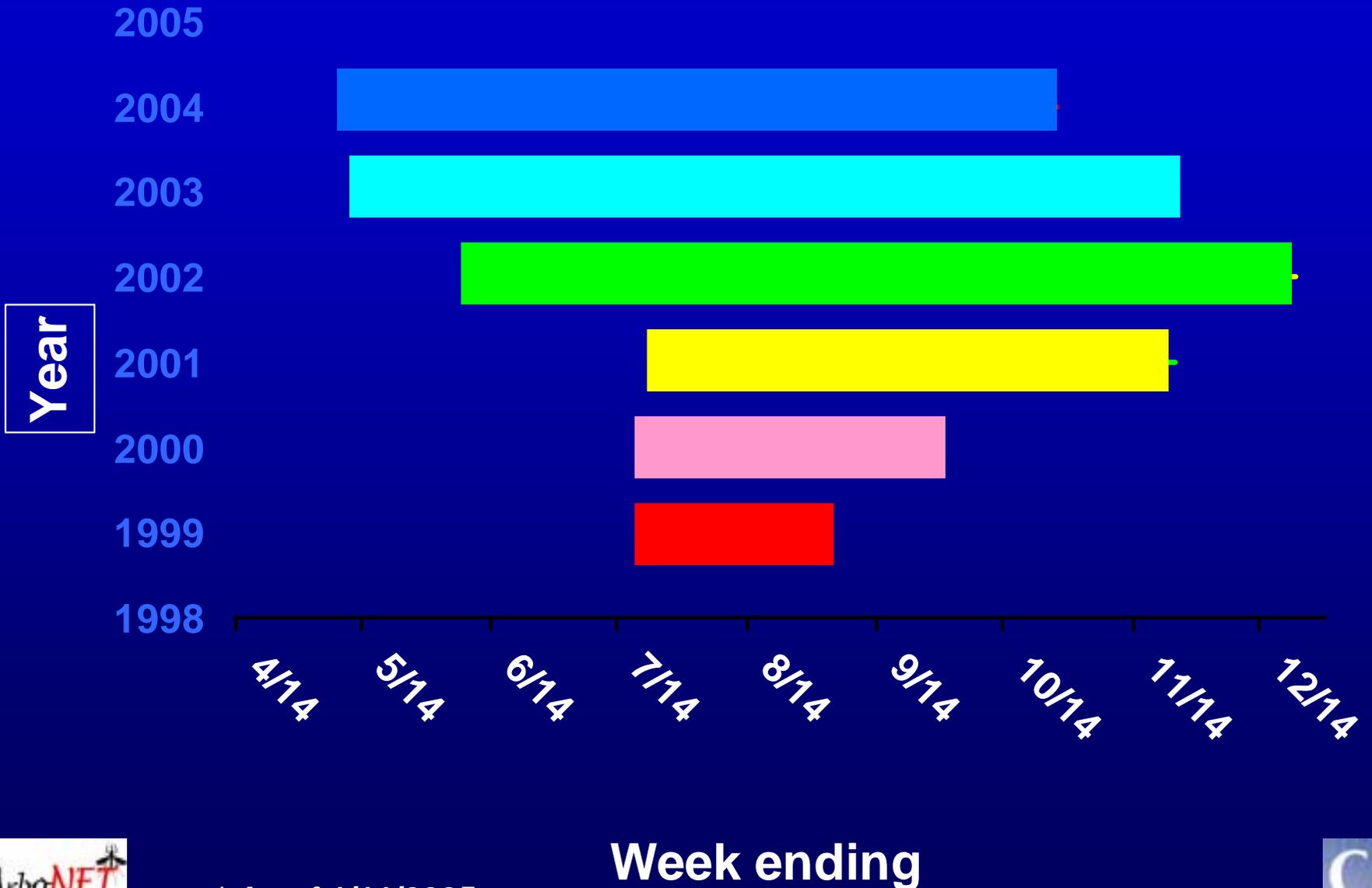
Through MMWR week 52 (ending 12/31/2004) - 505 counties
Reported and published through ArboNET as of 1/11/2005

CDC/NCID/DVBID

Reported WNV Disease Cases in Humans, United States, 1999-2004*

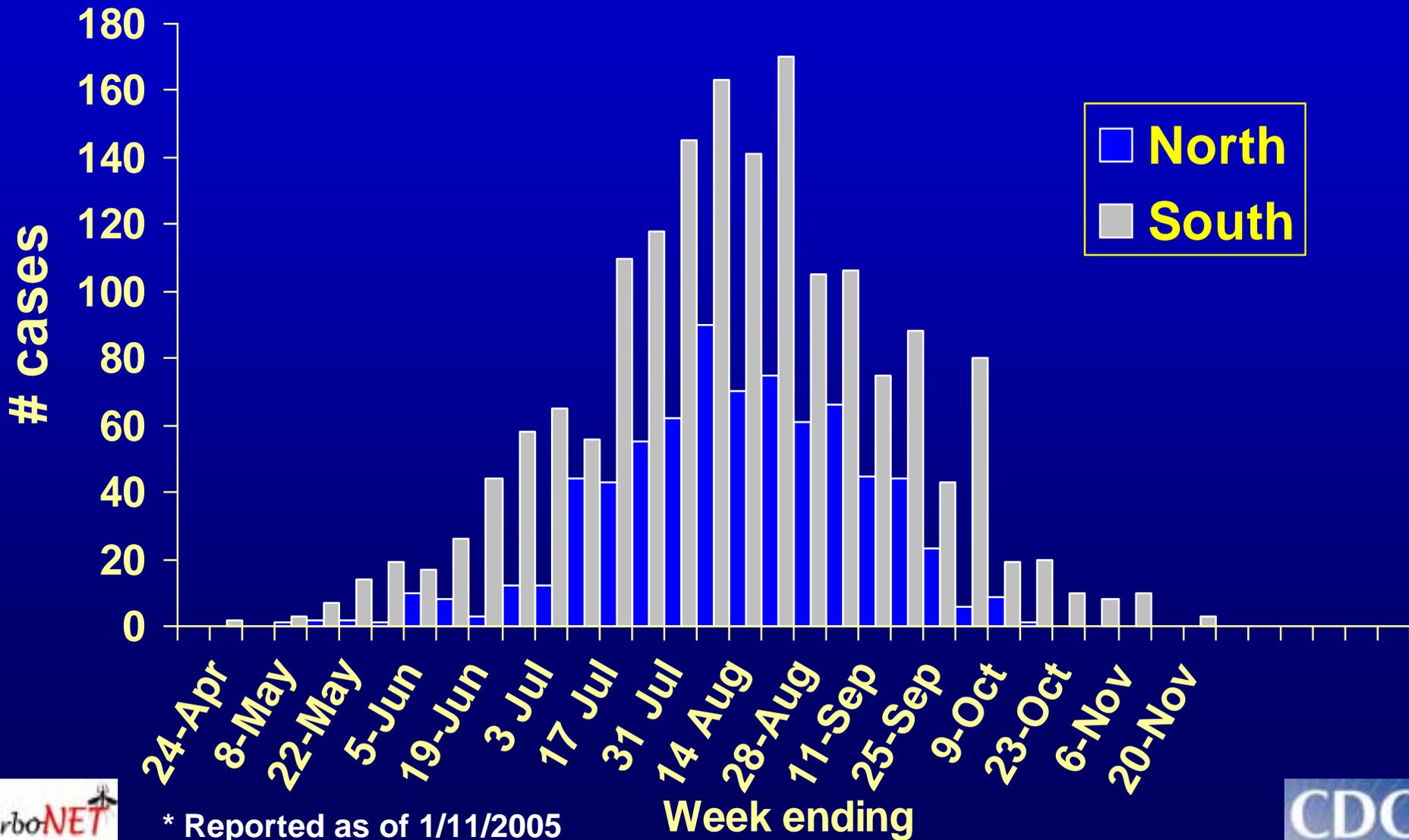
| Year | # States | # Counties | # Cases |
|------|----------|------------|---------|
| 1999 | 1 | 6 | 62 |
| 2000 | 3 | 10 | 21 |
| 2001 | 10 | 39 | 66 |
| 2002 | 39** | 740 | 4,156 |
| 2003 | 45** | 1,079 | 9,862 |
| 2004 | 40** | 505 | 2,470 |

Human WNV Disease Timeline, by Week of Onset, United States, 1999-2004*



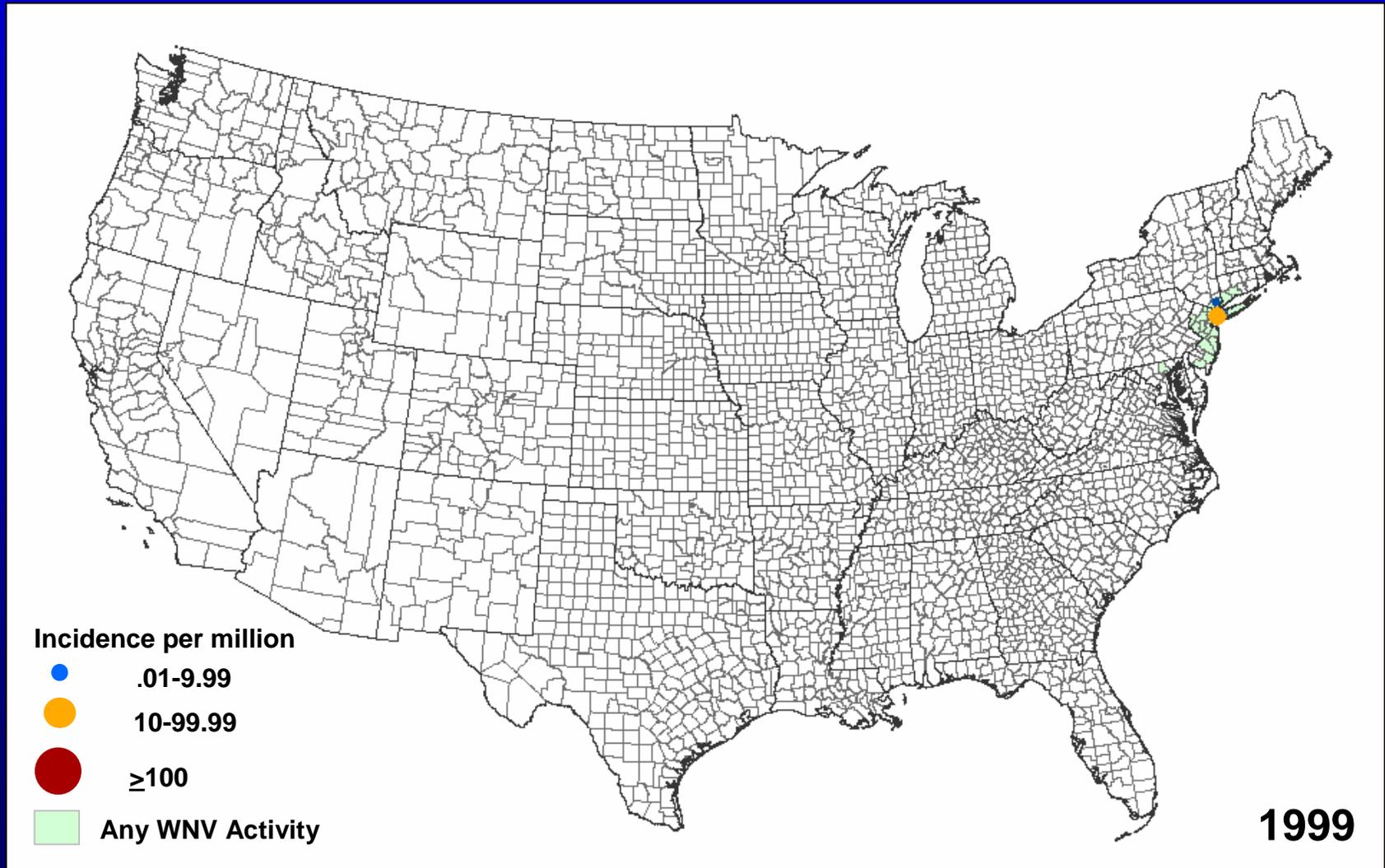
* As of 1/11/2005

Human WNV Disease Cases, by Week of Onset, Northern vs. Southern United States, 2004*

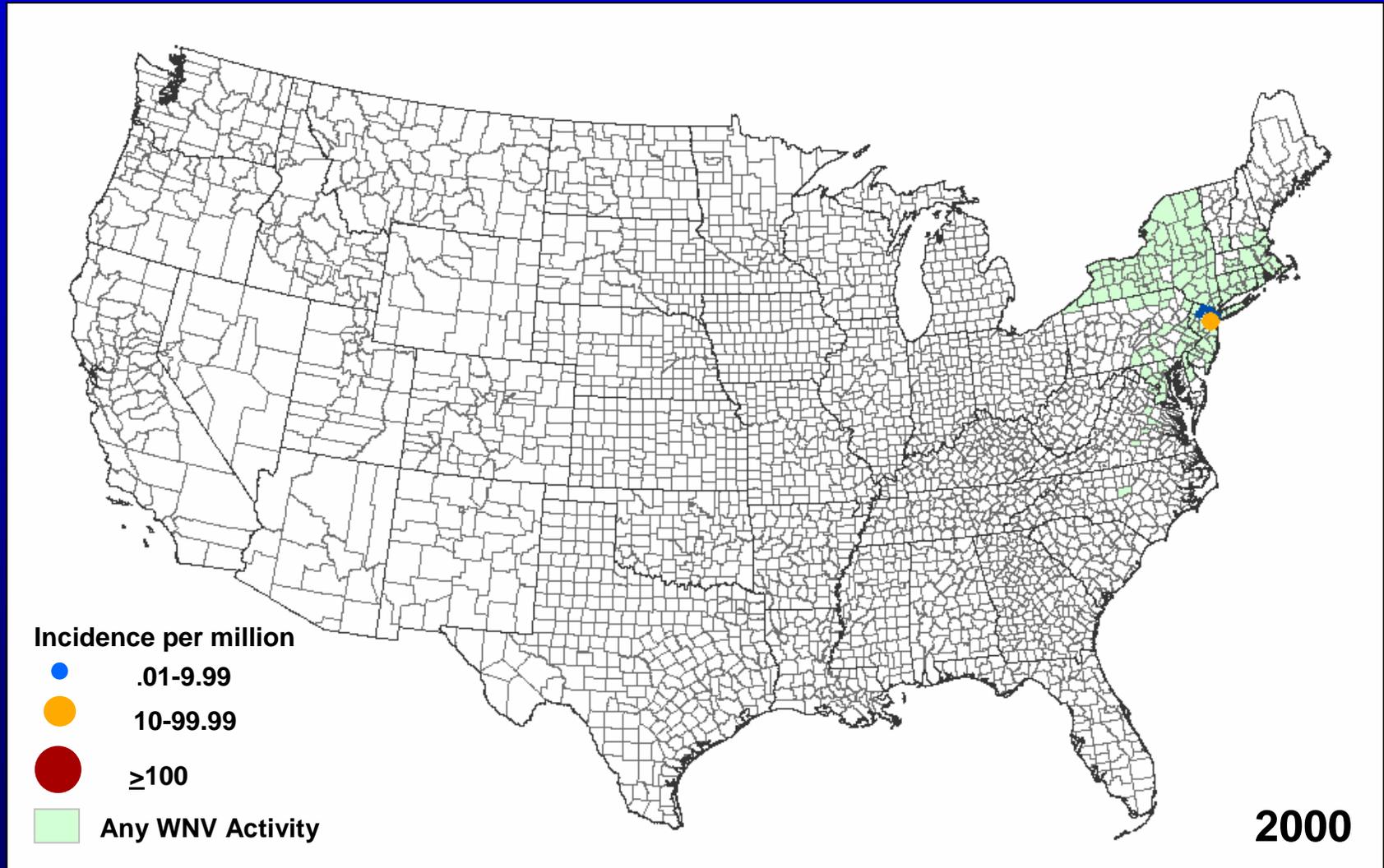


* Reported as of 1/11/2005

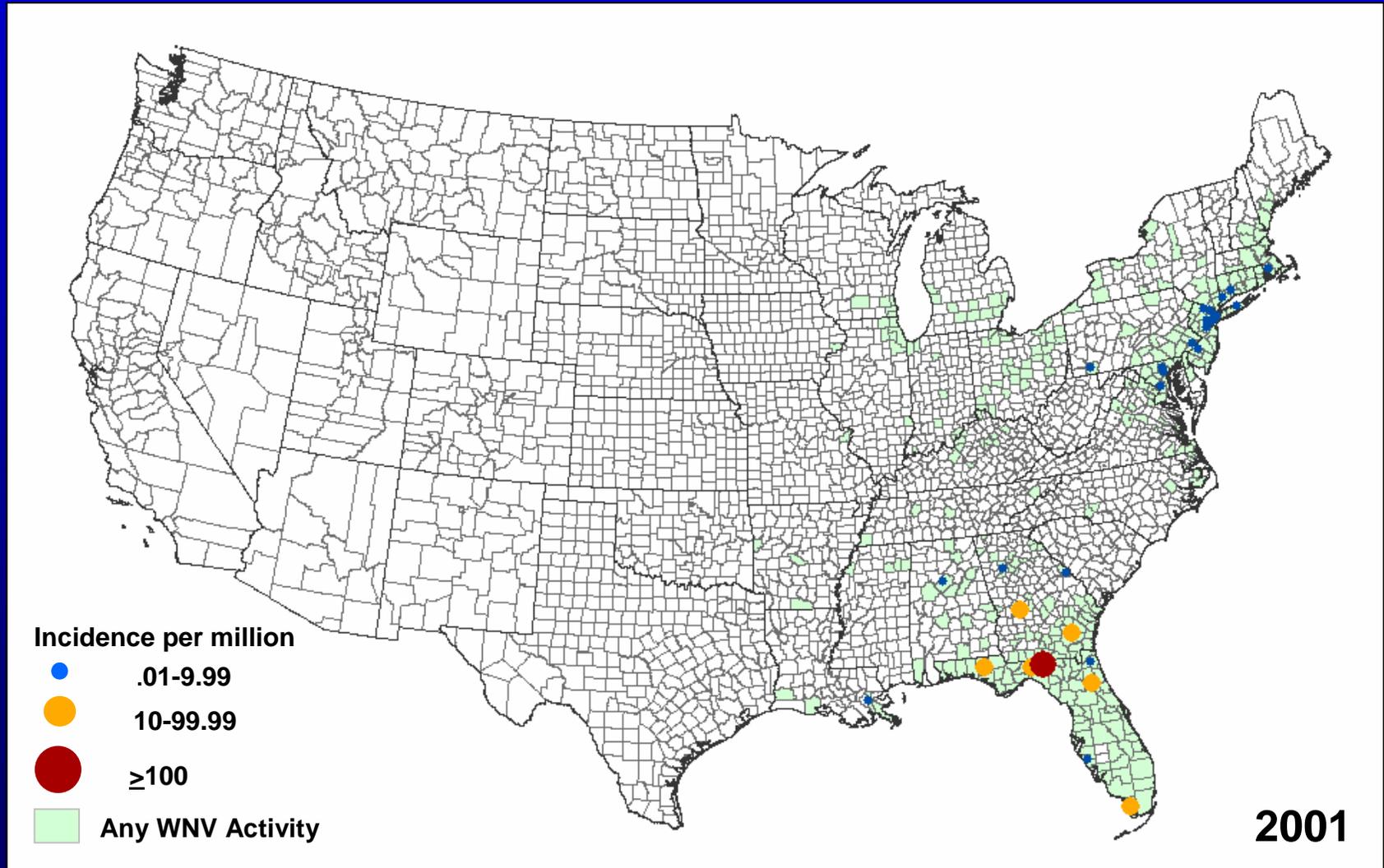
WNND County Level Incidence per Million, United States, 1999



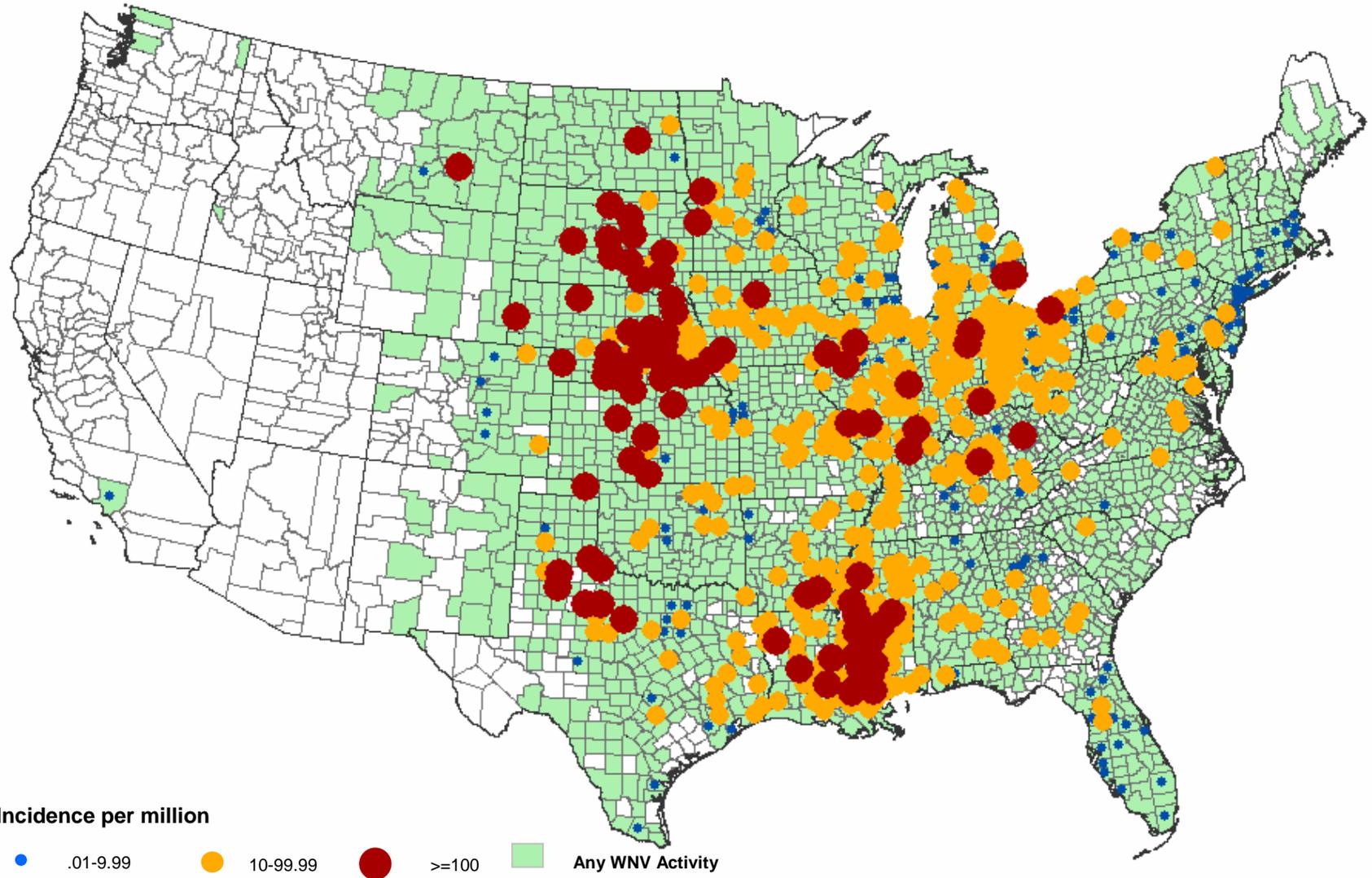
WNND County Level Incidence per Million, United States, 2000



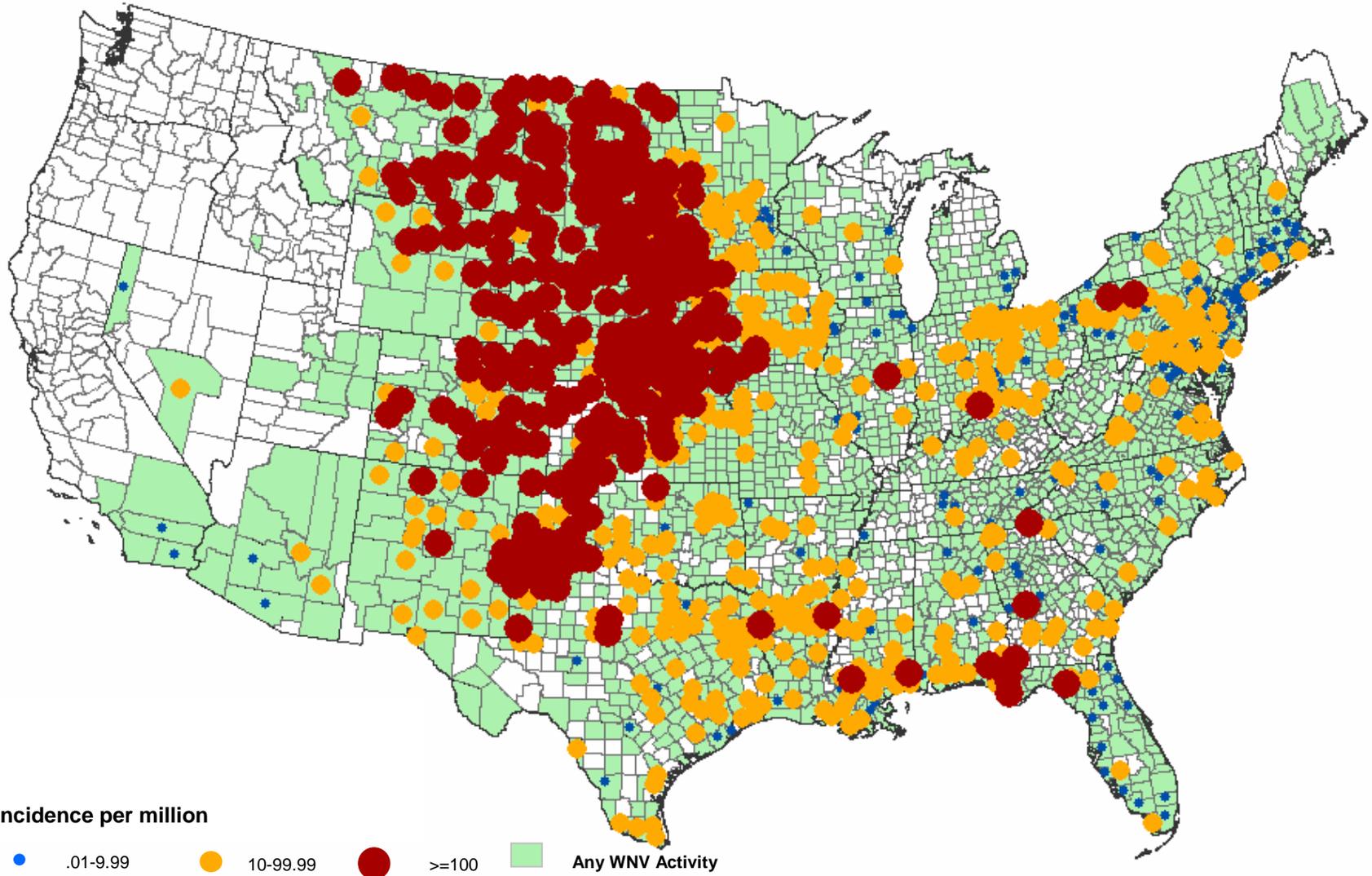
WNND County Level Incidence per Million, United States, 2001



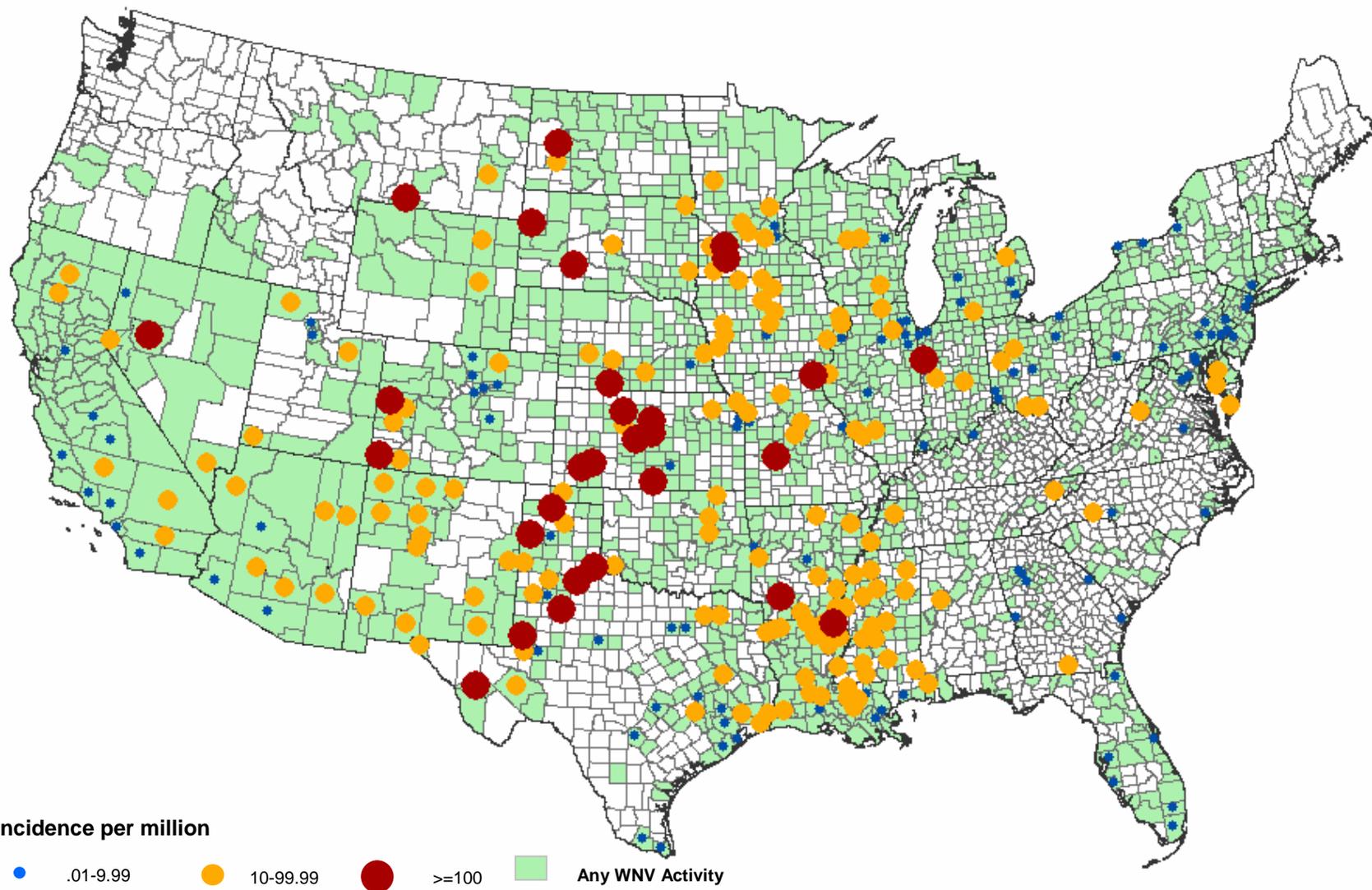
WNND County Level Incidence per Million, United States, 2002*



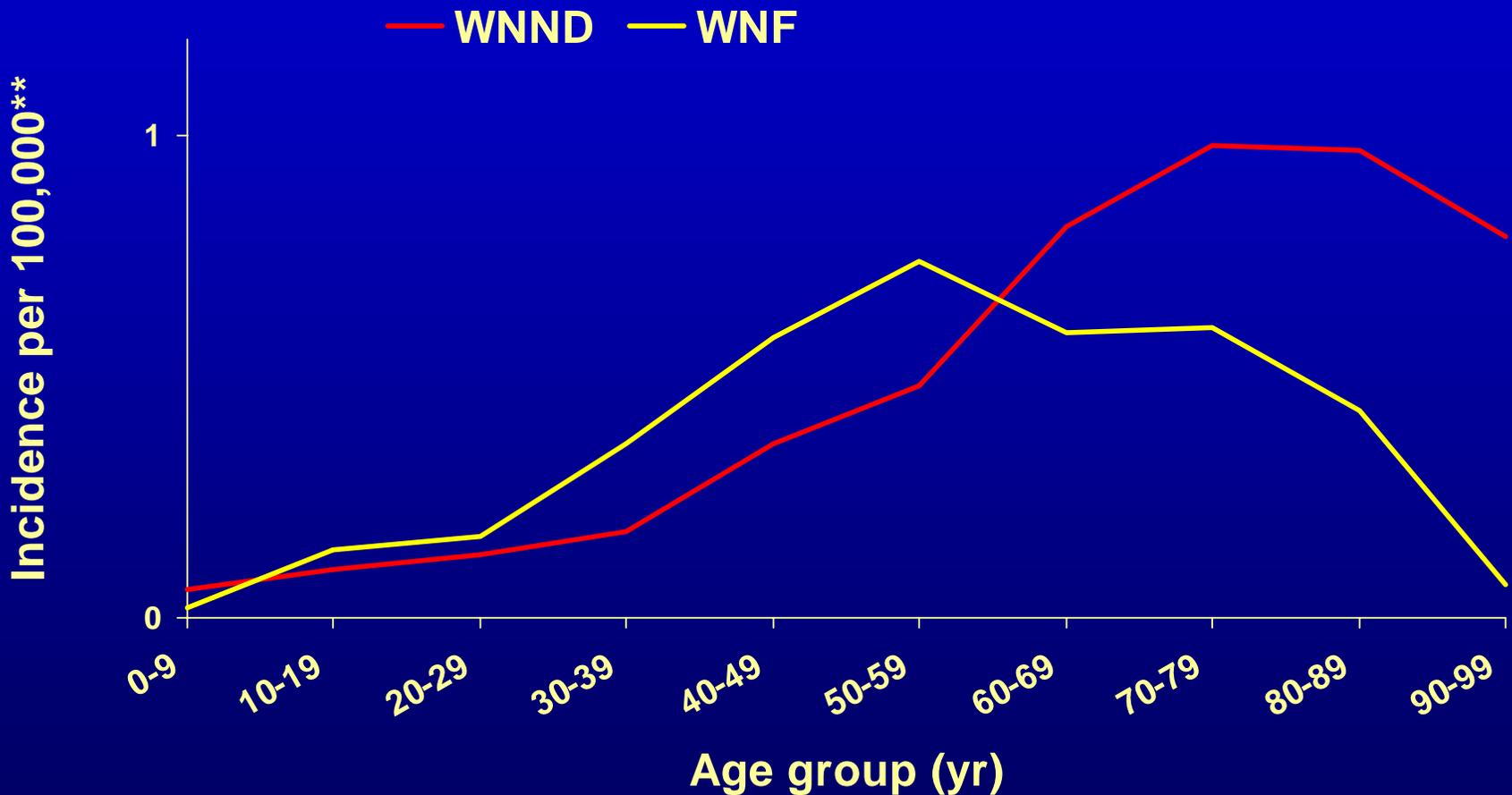
WNND County Level Incidence per Million, United States, 2003*



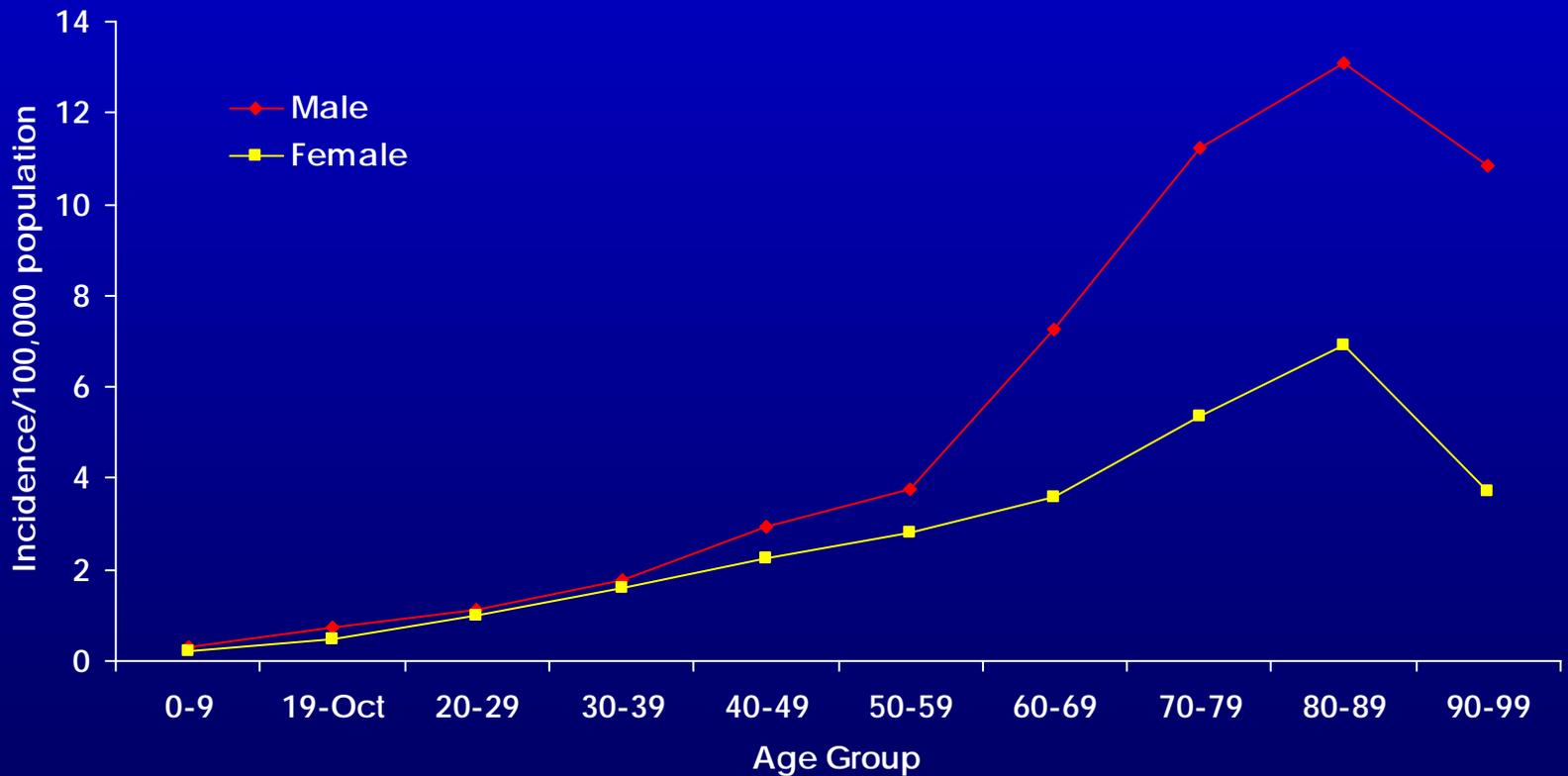
WNND County Level Incidence per Million, United States, 2004*



Human WNV Disease Incidence, by Age Group and Clinical Category, United States, 2004*



West Nile Virus Neuroinvasive Disease Incidence by Age Group and Gender, 1999-2004*

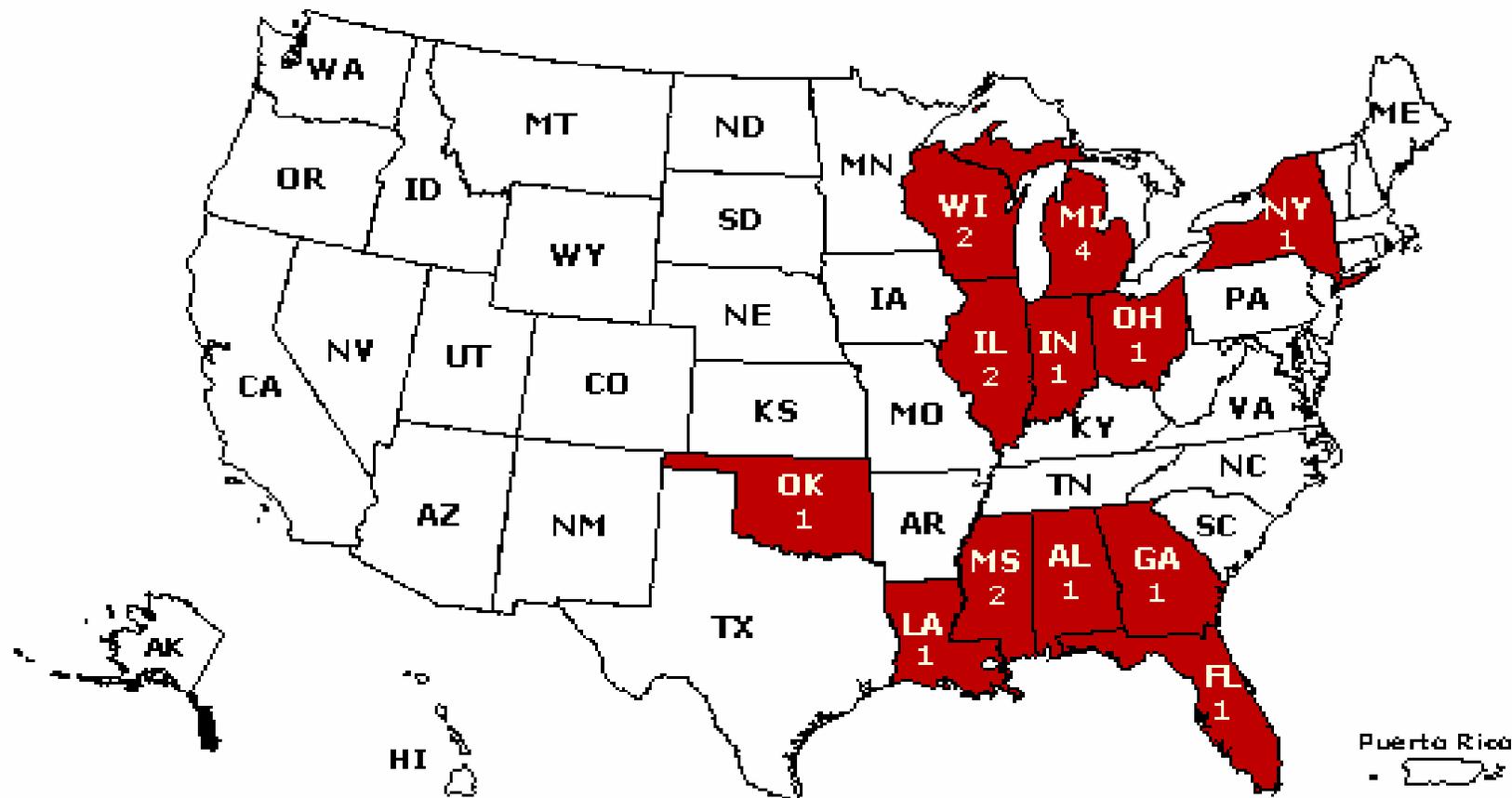


* Reported as of 1/11/2005

WN Viremic Blood Donors Causing Transfusion-associated Transmission, United States, 2002*



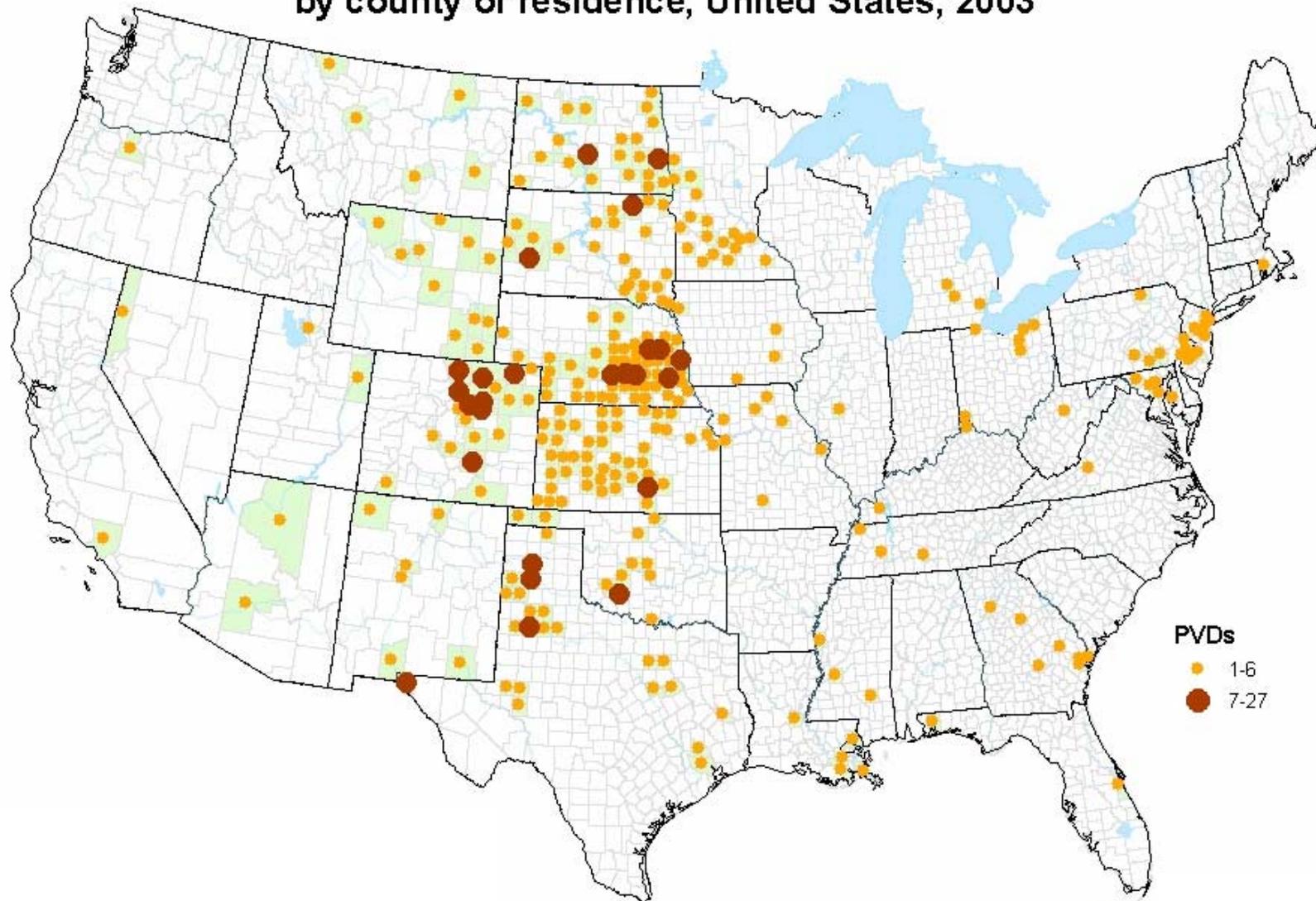
 Viremic Blood Donors.



WNV Blood Screening, 2003

- FDA investigational new drug (IND) protocol
- Nucleic acid amplification tests
- Minipool format (like HCV, HIV)
- Blood banks reported presumptively viremic donors (PVDs) to local public health department
- Public health departments report to ArboNET
 - Clinical follow-up
 - Demographics

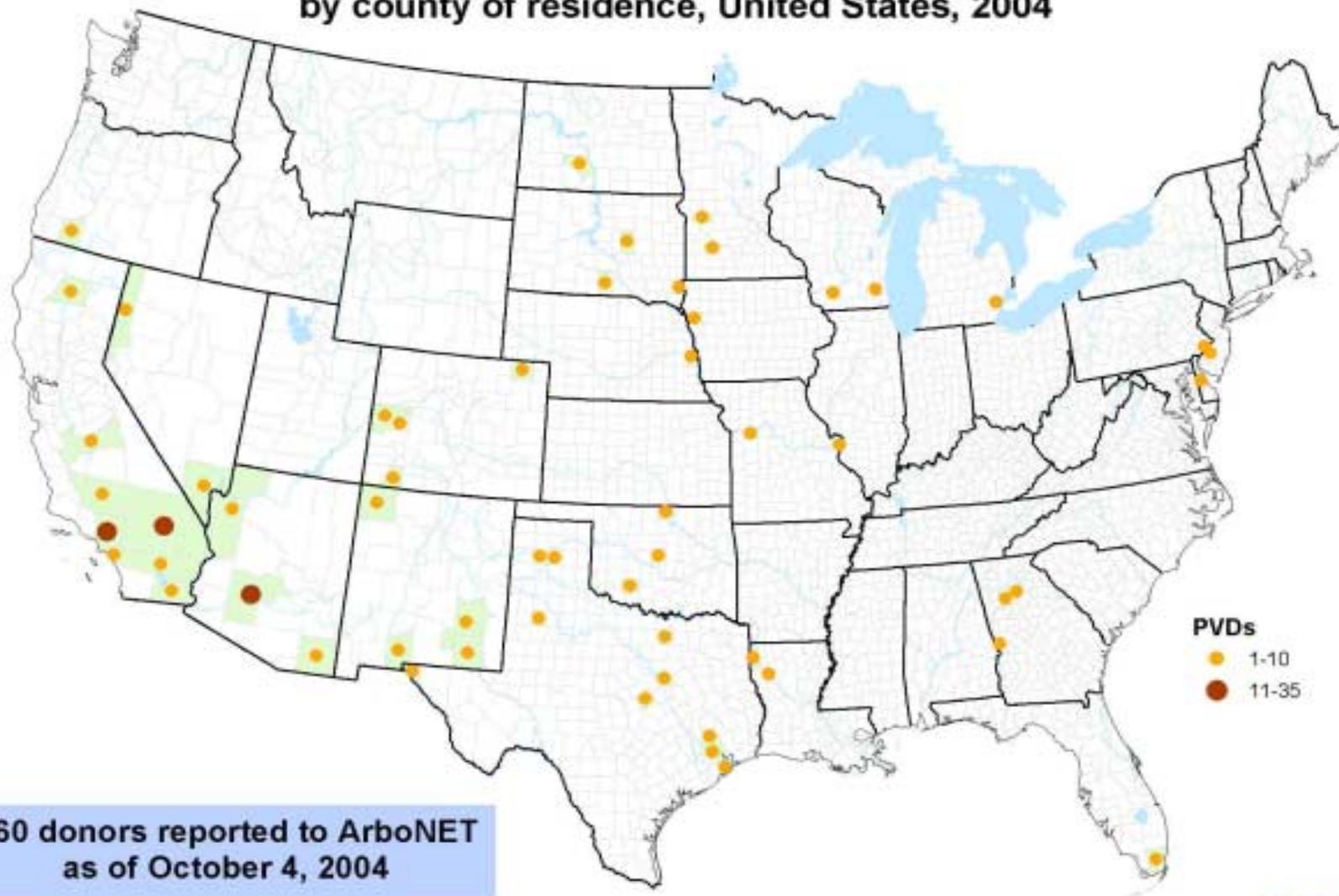
West Nile viremic blood donors,* by county of residence, United States, 2003



* Reported to CDC/ArboNET by state and metropolitan health departments. Reports are presumptive and confirmatory investigations may be ongoing. Some viremic donors known to the blood banks and health departments may not be reported here. For more summary information on reported viremic blood donors, go to the MMWR online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5232a3.htm>.



West Nile viremic blood donors,* by county of residence, United States, 2004



**160 donors reported to ArboNET
as of October 4, 2004**

ArboNET

* Reported to CDC/ArboNET by state and metropolitan health departments. Reports are presumptive and confirmatory investigations may be ongoing. Some viremic donors known to the blood banks and health departments may not be reported here. For more summary information on reported viremic blood donors, go to the MMWR online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5232a3.htm>.

CDC

PVDs Reported to ArboNET*, 2004

- Over 8 million donations screened
- 199 PVDs reported to ArboNET
 - Information for 195 PVDs:
 - 59 (30%) develop WNF
 - 3 (1.5%) develop WNND
- 133 (68 %) reported from 4 states: AZ, CA, NM, TX
- Last PVD reported 9/16/2004 from California

* Reported by health departments as of 1 /11/2005

WNV Transfusion-associated Transmission Investigations, 2004

- 14 case investigations initiated
 - 8 non-cases
 - 3 inconclusive
 - 2 open investigations
 - 1 probable case
 - MMWR 9/17/04

SUMMARY

1999-2004 US WNV Surveillance Totals

| <i>Category</i> | <i>Number</i> | <i>No. States</i> |
|---------------------------------------|---------------|-------------------|
| WNV-positive mosquitoes | 24,084 | 45 [†] |
| WNV-positive dead birds | 47,923 | 48 [†] |
| WNV-positive sentinel chickens/horses | 5,511 | 25 [‡] |
| WNV-positive animal | 22,069 | 47 [‡] |
| Human cases | 16,637 | 46 [†] |
| West Nile fever or unknown | 9,783 | 46 [†] |
| West Nile neuroinvasive disease | 6,854 | 46 [†] |
| Deaths | 654 | 46 [†] |

* Reported as of 1/11/2005

† Plus DC

‡ Plus Puerto Rico

Human WNV Disease, United States, 2004*

- Unofficial U.S. human totals:
 - 1,445 WNF cases or clinical category unknown
 - 1,054 WNND cases
 - 90 deaths
 - 40 states & D.C.

2004 National WNV Surveillance Summary

- West Nile virus activity continued westward
- 59 mosquito species; Culex common
- 294 bird species; corvids common
- No human cases reported from AK, HI, ME, WA
- Transmission season ran from April to November
- High incidence of WNV disease in CO, KS and TX
- Major new transmission foci: AZ & CA
- Much of CA and OR were minimally affected